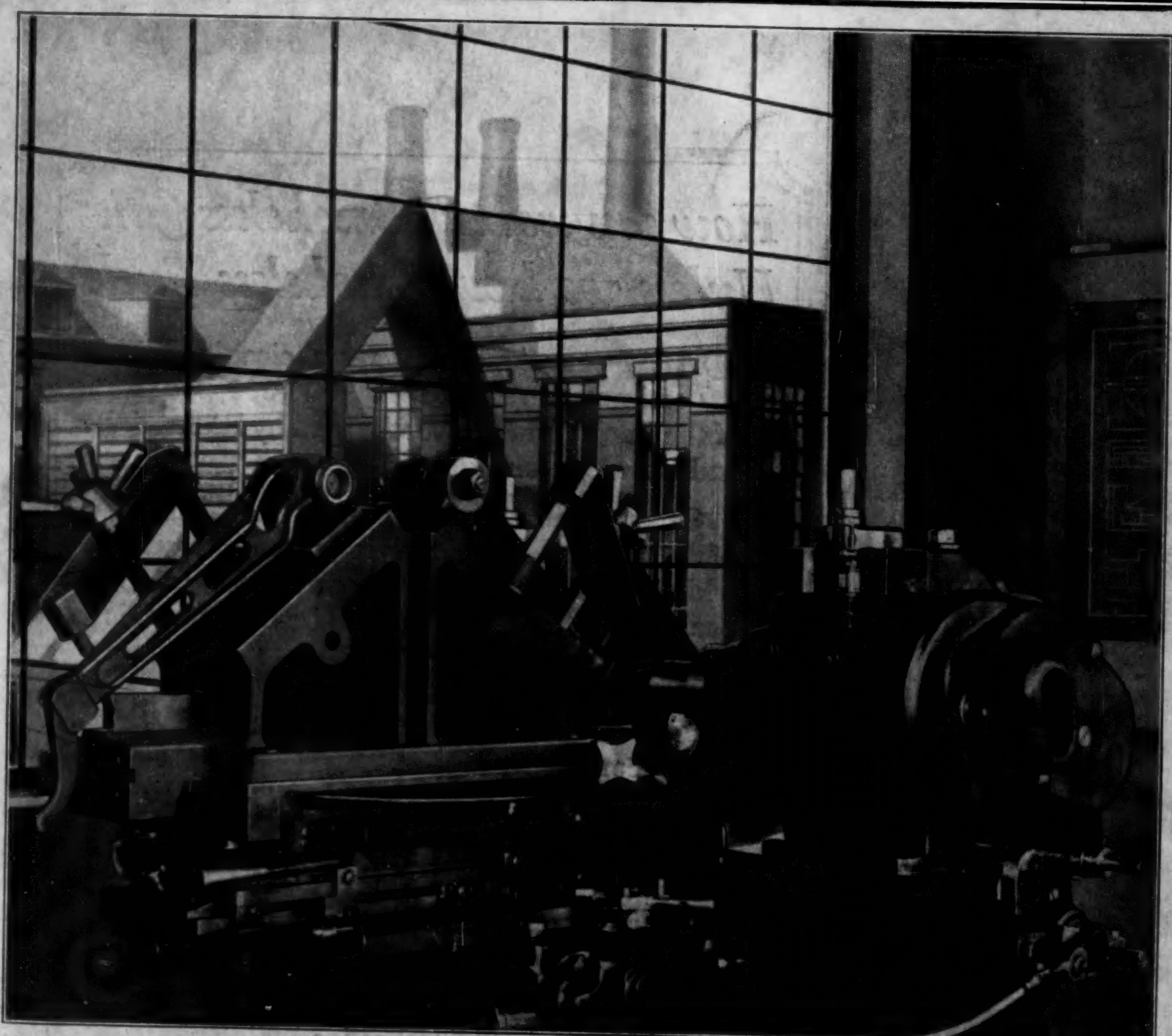
In Two Sections—Section One

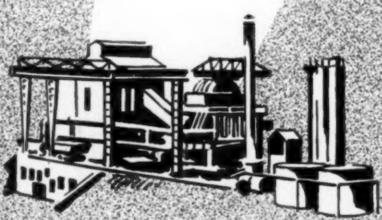
MECHANICAL ENGINEERING



THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

December 1928

RAW COAL



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DEPARTMENTAL

ADVERTISING

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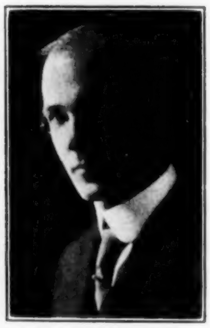
William Blum

E. O. Waters

J. W. Roe



A. G. Christie

C. B. Crockett

Contributors to This Issue

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A. G. Christie has served on the faculty of Johns Hopkins University since 1924, holding for the past eight years the chair of mechanical engineering. He was graduated from the School of Practical Science of Toronto University in 1901, later receiving his M.E. degree. Upon graduation he first became connected with the Westinghouse Machinery Co. and later was for a year an instructor in mechanical engineering at Cornell University. For two years he was with the Allis-Chalmers Co., then becoming mechanical engineer with the Western Canada Cement & Coal Co. Professor Christie is a well-known consulting engineer and has conducted many investigations both here and abroad on power plants and their equipment.

E. O. Waters, associate-professor of mechanical engineering in charge of machine design, Sheffield Scientific School of Yale University, was graduated from that institution in 1914 with the degree of M.E., and for the next four years held the position of instructor in machine design there. During 1918 he was in the office of the Chief Ordnance Officer, A.E.F., returning to Yale University in 1919. During the summer months he has spent considerable time in the engineering and test departments of the Winchester Repeating Arms Co., the Cincinnati Milling Machine Co., the General Electric Co., and various other concerns.

William Blum, in charge of investigations on electrodeposition at the U. S. Bureau of Standards, received his B.S. degree from the University of Pennsylvania in 1903, and in 1908 his Ph.D. From 1903 to 1909 Dr. Blum was associated with the University of Utah as instructor and assistant professor of chemistry, then becoming connected with the Bureau of Standards. He has been a frequent contributor to the technical press.

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C. B. Crockett, on the staff of the Society for Electrical Development, Inc., in charge of the market-development program for electric industrial trucks and tractors, received his engineering degree from the Harvard Engineering School. He was then for several years in the employ of Dwight P. Robinson & Co. and the Byllesby Engineering and Management Corporation. He is a member of the U.S. Department of Commerce Committee on Simplification of Skid Platforms.

This Month's Cover, used in connection with Professor Roe's paper on "Principles of Jig and Fixture Practice," shows the operation of milling the bosses of two catch-arm bars of a textile machine. A fixture holding one piece is mounted at either end of the index base. Two shell end mills, one on each spindle of the duplex machine, are used to finish both faces of the boss at once. The finished hole in the upper boss is placed over a stud. The lower end rests in a V-block placed back of the boss to be finished. Side location is secured by action of the V-block, and a pilot-wheel-operated clamp just above it holds the work while milling. The photograph is shown through the courtesy of the Cincinnati Milling Machine Co.

MECHANICAL ENGINEERING

Volume 50 December, 1928 No. 12

Principles of Jig and Fixture Practice

By JOSEPH W. ROE,[1] NEW YORK, N. Y.

JIGS and fixtures have been developed empirically and there is much less technical literature covering them than there is on power machinery and its utilization, or even on the very machines on which fixtures are used. Judging only from the literature available, one would gain no idea of their economic importance. However, the competitive technical advantage of one manufacturing plant over another will usually lie more in the better quality of its small tools, jigs, and fixtures than in differences between the types of machine tools in the respective plants.

The principles of good work-holder practice have grown up in the tool rooms and been handed down from man to man. Due to the multiplicity and variety of articles manufactured, there is a great diversity of fixtures and holding devices, so great as to preclude treatment of all their details in a paper such as this. But through all fixtures there run certain principles which have been developed gradually and come to be recognized as good practice. Many of these principles can be brought together, and it is the purpose of the present paper to do this.

Economic Principles

The first and most important element, which applies to all forms of work holders, is the economic one.

In dealing with fixtures, the economic problem centers on answering one or more of the following questions:

1 How many pieces must be run to pay for a fixture of given estimated cost which will show a given estimated saving in direct-labor cost per piece? For instance, how low a run must we have to justify a fixture costing $400 which will save 3 cents on the direct-labor cost of each piece?

2 How much may a fixture cost which will show a given estimated unit saving in direct-labor cost on a given number of pieces? For instance, how much can we put into a fixture to "break even" on a run of 10,000 pieces, if the fixture can save 3 cents on the direct-labor cost of each piece?

3 How long will it take a proposed fixture, under given conditions, to pay for itself, carrying its fixed charges while so doing? For instance, how long will it take a fixture costing $400 to pay for itself if it saves 3 cents on the direct-labor cost per unit, production being at a given rate?

Questions 1, 2, and 3 assume that we just break even. There is also the very practical question:

4 What will be the profit earned by a fixture, of a given cost, for an estimated unit saving in direct-labor cost and given output? For instance, what will be the profit on a $200 fixture if it will save in direct-labor cost 3 cents a piece on 10,000 pieces?

These questions involve something more than the simple arithmetic which seems all that is necessary for answering them, because, while the credit items for the fixtures depend mainly on the number of pieces machined, the debit items involve time, and also the number of set-ups required, i.e., whether the pieces are run off continuously or in a number of runs.

An important time element is that many companies now require that any new equipment shall pay for itself in a certain period. Investigations by the *American Machinist*[2] and *Manufacturing Industries*[3] show wide variation in practice as to this requirement, ranging from one to six or seven years, the longer period being used by railroad shops which have a stable class of work not liable to rapid obsolescence. The general practice seems to be about two years, but conditions even within one shop might warrant lengthening or shortening this period for different specific cases.

Proposed Equipment Formulas

Let N = number of pieces *manufactured per year*

Debit Factors

A = yearly percentage allowance for interest on the initial investment
(If the interest be taken on the *depreciating* value, this becomes, under uniform depreciation for n years, $A \times \frac{1}{2}\frac{n+1}{n}$, the value of which decreases from A, for one year, and approaches $A/2$ as n grows large. For a life of two years this is $3A/4$, and for three years it is $2A/3$. In the following formula either the original cost or the depreciating value can be used with equal facility. It is recommended, however, that one or the other basis be used uniformly to facilitate comparisons)

B = yearly percentage allowance for insurance, taxes, etc.

C = yearly percentage allowance for upkeep

$1/H$ = yearly percentage allowance for depreciation and obsolescence on the basis of uniform depreciation where H is the number of years required for amortization of investment out of earnings.

E = yearly cost of power, supplies, etc. consumed, in dollars. (When the equipment under consideration is wholly new, this item appears in full. When it replaces old methods or equipment, the difference only is used. It is a debit if the E on the new equipment exceeds that on the old. It is

[1] Professor, Industrial Engineering, New York University. Mem. A.S.M.E.

Contributed by the Machine Shop Practice Division for presentation at the Annual Meeting, New York, December 3 to 7, 1928, of The American Society of Mechanical Engineers. Abridged. Space limitations have made it necessary to leave out much of the introduction, economic principles, general principles of design, and the appendixes giving a subject index and bibliography in the field of jigs and fixtures. The complete paper, with discussion, will be published in vol. 51, Trans. A.S.M.E.

[2] "Getting the Most Out of Your Machine-Tool Dollar," published by *American Machinist*, New York, 1927, pp. 199–203.

[3] *Manufacturing Industries*, Jan., 1928, pp. 27–31.

a credit if the new E is less than the old. E in the formula may therefore be + or —.) In many cases, with fixtures this item is small and may be disregarded

I = estimated cost of the equipment or fixture, i.e., cost installed and ready to run, including drafting and tool-room time, material and tool-room overhead, in dollars

K = unamortized value of the equipment displaced, less scrap value, in dollars. Note: In the case of fixtures for new work, K drops out

$YCSU$ = Yearly Cost of Set-Ups, in dollars. This should include the time required for taking down the apparatus and putting machine into normal condition. In some plants with departments large enough to employ several tool setters regularly this time can be included in the department overhead. In this case this factor disappears as a separate item

Credit Factors

S = yearly saving in direct cost of labor, in dollars
= N (old unit labor cost, minus the new unit labor cost)
= N (saving in unit labor cost)
= N ($SULC$) using initials as a mnemonic symbol. This covers *direct* unit labor cost only

T = yearly saving in labor burden, in dollars
= St (t is the percentage used on the labor saved.
= N ($SULC$) t

U = yearly saving or earning through increased production in dollars
= saving in unit labor cost × increased *yearly* production capacity
× the percentage of that increased capacity which will be utilized
× (1 + t) (this cares for the burden saved)
+ cost of extra old equipment which would be necessary to care for the increase if the improvement were not adopted
(Note: In many cases U may drop out.)

V = yearly net operating profit, in excess of fixed charges, in dollars.

Proposed Formulas

If we just "break even," we have:

Yearly Operating Savings = Total Fixed Charges per Year

Using the above symbols,

$$(S + T + U - E) - \text{Yearly Cost of Set-Ups} = I(A + B + C + 1/H) + KA$$

Since $S + T = N(SULC) + N\,(SULC)\,t = N\,(SULC)\,(1 + t)$,

$$N\,(SULC)\,(1 + t) + U - E - (YCSU) = I\,(A + B + C + 1/H) + KA \quad \ldots\ldots [1]$$

To find the number of pieces required for a given cost I we have, solving for N,

$$N = \frac{I(A + B + C + 1/H) + (YCSU) - U + E + KA}{(SULC)\,(1 + t)} \quad \ldots\ldots [2]$$

To find the cost I which will just earn fixed charges we have, solving Equation [1] for I,

$$I = \frac{N\,(SULC)\,(1 + t) - (YCSU) + U - E - KA}{(A + B + C + 1/H)} \quad \ldots\ldots [3]$$

To find the net operating profit over all fixed charges we have

V = gross operating profit, less set-ups and fixed charges

$$= N\,(SULC)\,(1 + t) - (YCSU) - I(A + B + C + 1/H) + U - E - KA \quad \ldots\ldots [4]$$

To find the time H in years for the fixture to just pay for itself, set net profit V in Equation [4] = 0. Then, setting the right-hand side of the equation equal to 0 and solving for H, we have

$$H = \frac{I}{N\,(SULC)(1 + t) - (YCSU) - I\,(A + B + C) + U - E - KA} \quad \ldots\ldots [5]$$

In most cases it will be found that U, E, and KA may be neglected, so that Equations [2], [3], [4], and [5] may be written as follows:

$$N = \frac{I(A + B + C + 1/H) + (YCSU)}{(SULC)\,(1 + t)} \quad \ldots\ldots [6]$$

$$I = \frac{N(SULC)\,(1 + t) - (YCSU)}{(A + B + C + 1/H)} \quad \ldots\ldots [7]$$

$$V = N(SULC)\,(1 + t) - (YCSU) - I(A + B + C + 1/H) \quad \ldots\ldots [8]$$

$$H = \frac{I}{N(SULC)\,(1 + t) - (YCSU) - I(A + B + C)} \quad \ldots\ldots [9]$$

The items A, B, and C, once settled upon, need change little. If the plant has the practice of requiring new equipment to pay for itself in a definite time H, say, two years, the depreciation $1/H$ may be added to the other carrying charges, making a single percentage factor for the term $(A + B + C + 1/H)$ which can be used until the management deems that changed conditions require modification.

The complete paper gives examples of the use of these formulas.

It is recommended that in authorizing expenditures for all fixtures and tools, above some minimum cost which could be set, an estimate be made of the

a Cost of the fixture
b Output of the fixture, and
c Profit or saving from it.

Also, that when it is put into operation the results be checked with these estimates.

Such a procedure would give a check on the quality of the tool designing. If tool costs are overrunning the estimates and the output and savings falling short, the facts wi'l be shown up. If the tool work is good the management will know it, and have means for measuring the profit therefrom.

Certain General Principles

Before a set of fixtures can be designed, the dimensions of the article to be manufactured must be definitely determined. This means that clearances and allowances must be made on certain dimensions for running, sliding, or driving fits. Furthermore, the tolerances, or permissible deviations, must be established. These tolerances set the high and low limits for each dimension, which cannot be exceeded without encroaching on the allowances necessary for proper functioning or destroying the interchangeability of the parts. In general, the smaller the tolerances the greater the cost of production, consequently they should be as liberal as is consistent with the requirements of the product, and accuracy should be centered on those dimensions on which it is essential. The closeness of the tolerances governs the de-

sign and workmanship of the jig or fixture quite as much as the required rate of production.

When the drawings of the article to be manufactured have been checked and approved, a model should be made to within the tolerances given on the drawings. When this has been tested and pronounced satisfactory, any changes found necessary in allowances, tolerances, etc. should be incorporated into the drawings. The model and drawings can then be used as the basis for design of the jigs and fixtures. If during the building of the tools any discrepancy should develop between the model and the drawings, the approved working model should govern, and the drawings be corrected to agree with it. When actual model parts are not available, wooden models of such parts as drop forgings, with the location of the sprue and flash line painted on them, may be helpful.

Only a few of the general principles given in the complete paper are included in the present abridgment.

In tooling up for the manufacture of a piece, an operation sheet should be prepared which includes every operation on the piece both of production and of inspection or gaging, showing them *in a single list* in the order of their application. The preparation of such a list focuses attention not only on the best sequence of production operations, but on the number of inspections needed, the dimensions they should cover, and the best points in the sequence at which they should occur. It also brings out the best grouping of operations and their reduction to the least possible number.

The fixtures should be tied in with the system of gaging. The same points or surfaces should be used for locating the work in the fixtures and for reference points in the gages. Only by so doing are the gages a direct check on the fixtures. Some deviation is made, however, as when inspection gages are made to cover a sub-assembly of parts in order to insure that certain collective deviations do not exceed permissible tolerances. In some cases also, as with pistons, it may be desirable to provide lugs especially for holding and driving during manufacture, which are removed in the last operation.

The same working points should be used on the two parts which go together in the manufactured output. This better insures interchangeability of the finished product.

In selecting the working points the functioning of the product and those dimensions which are most important to its operation should be given most careful thought.

It is of fundamental importance that, once settled upon, the same working or locating points be used for as many operations and gagings as possible. Preferably they should be permanent and remain in the piece when finished. If this cannot be done they should be retained as long as may be. If first one point and then another be used, an accumulation of errors creeps in which may exceed the tolerances. It is tempting at times to shift the locating point, as the fixture and gage might then be made more cheaply, but to do so is poor practice, and in the long run, poor economy. As an example of the above, in a set of fixtures recently built for a military rifle, 62 out of 67 operations on one piece, with their gagings, were located from one point.

It *may* be wise to shift the reference point, but it should be done only for good and sufficient reasons. For instance, the positions of two holes A may be referred to a main reference point. The important requirement of a second hole B may be exact distance from holes A without regard to the original reference point. In such case both the fixture and the gage would very properly locate B with reference to the holes A.

In general it is desirable to machine as many surfaces, or drill as many holes, as possible at one setting. This makes for accuracy, lessens tool expense, and cheapens production, but is subject to some limitations, as, for instance, the combination of a very large and very small hole in the same jig. It may be better to use two jigs on different-sized machines. In some cases all the holes can be drilled in the same jig on one machine, and the larger holes then redrilled on another machine without a jig. This eliminates the cost of one jig.

How far it is desirable to make a fixture adaptable to various pieces and operations is a matter of judgment in each case. It usually does not pay except where the runs are very small. In general, specialization is better than adaptability, because the latter, while it lessens tool expense, permits errors in settings and "monkeying" with the set-up.

Fixtures should be interchangeable on the various machine tools on which they can be used. Care in this particular allows greater flexibility in scheduling work through the shop. This principle calls for the standardization of slots on milling machines, machine tables, and of keys and keyways on the fixtures. So far as possible these should conform to the standards adopted by The American Engineering Standards Committee, and sponsored by such bodies as the A.S.M.E., the National Machine Tool Builders' Association, and others.

Despite the wide variety in jigs and fixtures, many details may be standardized, such as bushings, latches, handles, thumbscrews, etc. This lowers costs not only by making approach to quantity production possible in the tool room, but by making it possible to purchase them from firms specializing in such parts. It is amazing in going through large tools storages to see how many types of handles, etc. there are, differing from each other in unessential details in ways which run up costs without any compensating benefit.

A jig or fixture should:

a Locate the work quickly and positively

b Preclude insertion of the work in any but the position correct for cutting

c Provide rapid and positive clamping *without undue effort*

d Allow no spring in the work, fixture, or machine table from either clamping or the pressure of the cutting tools

e Allow no slipping, vibration, or chatter during the cut

f Have ample clearance for chips, and be easily cleaned

g Allow free access and egress for cutting oil or compounds

h Be as light as is consistent with strength and rigidity, and easy to handle. In the long run the employer always pays for weariness, necessary and unnecessary. It is good design, therefore, to eliminate all unnecessary fatigue

i Be safe for the operator. Production should be sacrificed, if necessary, rather than have a tool which is dangerous.

SOME PRINCIPLES RELATING TO DETAILS OF DESIGN[4]

FEEDS

The pressure due to the feed and rotation of the cutter should be against the solid part of the fixture, not against the clamp. This principle is often violated, as the wrong way is usually more convenient. (Fig. 1.)

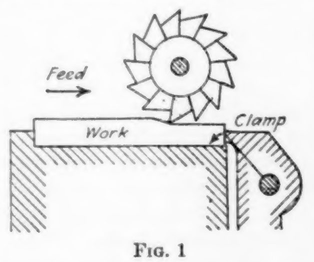

FIG. 1

In general the feed should be against the rotation of the cutter, not with it. This avoids a tendency to dig in. This has been good practice for many years. There is, however, some tendency away from this of late years.

Locate the feed and cuts to throw the burrs for the various cuts on the same side, to reduce burring operations as far as possible. In order to be sure

[4] For fuller treatment of details see Appendixes Nos. 1 and 2 to the complete paper.

that burrs do not vitiate correct setting in subsequent operations, it is wise to provide clearance grooves on locating surfaces so that burrs cannot, even if left on, interfere with correct setting.

Locating

Locating surfaces should be as small as is consistent with proper support and wear. The larger the surface, the more care and time are necessary to keep it clean and free from chips which destroy proper setting.

If a surface is to be matched in a milling operation, locate from *that* surface as at *B*, Fig. 2. It may be more convenient to locate from the opposite face but locating from the matching surface, is correct and produces better work. A variation in the thickness of even a half of a thousandth will show, although it may not affect the operation of the piece.

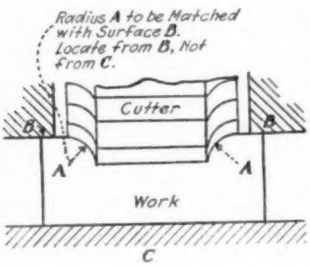

Fig. 2

Avoid sharp corners between locating surfaces. They catch dust and dirt and are hard to clean. (Fig. 3.)

The number of fixed supports should not be more than three. These should be as far apart as possible. If other supports are

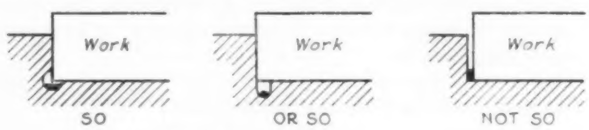

Fig. 3

needed they should have only spring tension against the work during clamping, and be locked in position after the work is set. For various forms of spring supports see references under "Plungers," Appendix No. 1 to the complete paper.

It should be easy to keep the locating surfaces clean, therefore there should be ample clearance for chips. If possible, accumulated chips should fall away from rather than on to the locating surfaces when the work is removed. If possible, keep the locating surfaces completely covered by the work, so that chips cannot collect on them.

All the locating surfaces of a jig or fixture should be fixed. Movable surfaces should be used for clamping only.

Buttons or pins, hardened and ground, are often better for locating than flat surfaces as they are easier to keep clean and afford easier adjustment for wear. They are better when acting endwise than sidewise as there is no bending action, and they are more readily set up for wear. (Fig. 4.)

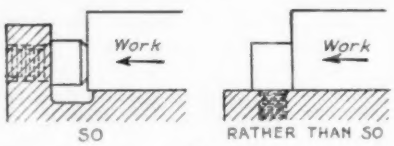

Fig. 4

It is better to support castings on buttons or pins than on flat surfaces. They position better and more definitely. Surfaces which locate drop forgings should have clearance for the flash, and preferably should be located from one side of the flash only, as the dies which made the forging may not have been exactly matched. Locating from the upper side of the forging, or that above the flash, is preferable.

The clamping should not produce any horizontal sliding action across the locating faces as this causes wear.

Locating and supporting points should be as far apart as the nature of the work will allow. (Fig. 5.)

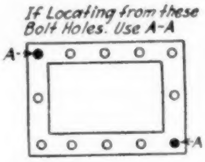

Fig. 5

The locating and support points should be visible and easily accessible to the operator.

Do not stack pieces one against another if accuracy is required. In multiple work each piece should be located independently against fixed stops. In well-designed fixtures this is done, although several pieces may be clamped by one motion.

In multiple milling fixtures do not mill the pieces serially, with a single cutter, if the runs are long. Use multiple cutters, one for each piece, and feed across the row. This reduces the length of feed and therefore the cutting time. This applies, of course, to fixtures with a reciprocating feed, not to those with rotary continuous feeds.

Parts of the fixture requiring accurate location should be held by screws and dowels or splines. The screws should not have to perform the double function of locating and holding. (Fig. 6.)

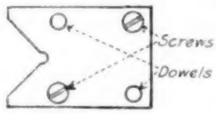

Fig. 6

When locating blocks are assembled into fixtures it is sometimes desirable to arrange the screws and dowels as shown in Fig. 7. When arranged this way the contacting surface only is hardened, leaving the section carrying the dowel pins soft, so that the reaming of the holes and the alignment of the piece can be done after hardening.

Where the positioning need be only in one direction, the side of the piece or preferably a tongue and groove may be used for locating, and the screws go through slotted holes. (Fig. 8.)

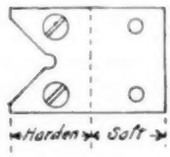

Fig. 7

If position pins are used for locating a previously drilled hole, that portion which is full diameter should be as short as is consistent with wear, and the rest or upper part of the pin tapering. (Fig. 9.)

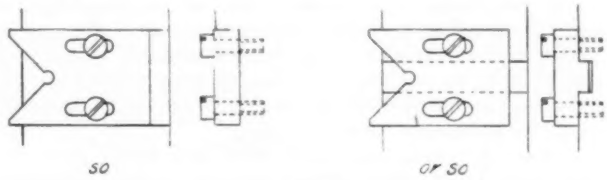

Fig. 8

The Tapered Pin works Faster and there is Less Liklihood of Sticking.

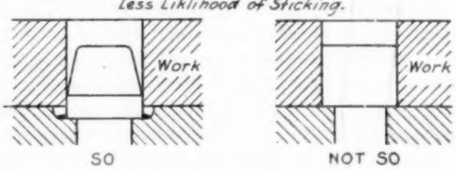

Fig. 9

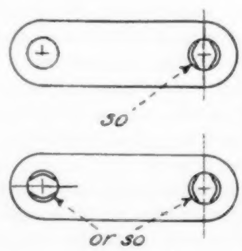

Fig. 10

Locating pins should be hardened and ground with clearance for burrs and chips. When used with counterbored holes they should center on only one diameter.

When two pins are used for locating, one should be flattened on the sides toward and away from the other pin. (Fig. 10.) Sometimes it is desirable to flatten both pins, the

plane of the flattening being at 90 deg. as shown in the lower figure.

If one pin is higher than the other, preferably the larger one, the work can be seated more rapidly.

Clamping

Under no circumstances should the line of clamping pressure come above the stop. If it did there would be a tendency to lift the work. Side clamps should press downward as well as inward. (See Fig. 1.) By so doing the clamping tends to seat the work.

The clamp should be immediately opposite the supporting point, with solid metal between. Disregard of this leads to springing the work, or lifting of the work due to the support's acting as a fulcrum. (Fig. 11.)

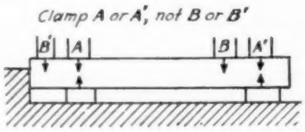

Fig. 11

Clamps and adjusting points should be operated from the front or working side of the fixture. (Fig. 12.)

The tool thrust should be

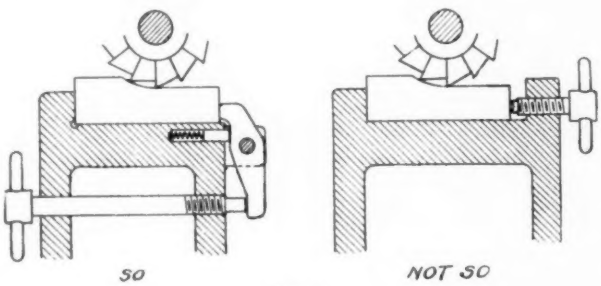

Fig. 12

taken up by an adequate, fixed stop, not by the friction between the work and the clamp. Clamping jaws should, if possible, be at right angles to the direction of the cut, not parallel to it.

All the clamping strain should be cared for within the fixture itself. None of it should be transmitted to the table of the machine.

Cams or wedges, if used for clamping, should be so designed that the pressure and feed tend to tighten them, not to loosen them.

Clamps should have springs and washers under them so that the operator will not have to hold them back while inserting the work. (Fig. 13.) A better form, with the spring concealed, so that chips cannot interfere with it, is shown in Fig. 14.

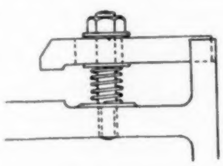

Fig. 13

To save time in loading and unloading a fixture, clamps which have considerable motion should, in order to clear the work, have a rapid action when free from the work and a slow motion with increased power when they are brought into contact with it. A variety of devices are available, such as the toggle joint, bayonet screw, interrupted thread, slotted clamp, etc.

Clamps holding castings and irregularly shaped surfaces should be on the floating principle to enable them to adapt themselves to the shape of the work.

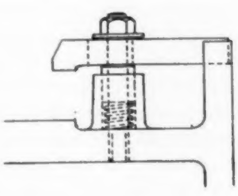

Fig. 14

Jig Legs

The center of gravity of the jig, with the work in it, and also the thrust of the drill should lie within the geometrical figure formed by the supports. This avoids a tendency to lift or tip.

A drilling jig should have *four* legs. With a three-legged support it will rest stable on any surface. If a chip is under one leg of a three-legged support the fact will not be detected. With a four-legged support the jig will teeter if it is on an uneven surface or a chip is under one of the supports.

Supporting strips or lugs are sometimes better than legs as they are less likely to drop into T-slots or holes in the machine table.

Jig Bushings

Loose or screwed-in solid bushings should not be used where accuracy is important. Where screwed-in bushings are necessary they should center on cylindrical surfaces, not on the threads.

The length of bearing for the drill should, in fixed bushings, be about $1^1/_2$ to 2 times the diameter of the drill; in slip bushings about 2 to 3 times the diameter of the drill. If the bushing is longer than this, the remainder of the length farthest from the work may be relieved.

Bushings should not be located close to the work with the object of carrying the chips up through the bushing except when the holes to be drilled are in a machined face which is clamped against a similar face in the jig. It is better, when the design will permit, to allow the chips to clear between the work and the bushing. About one drill diameter is usually sufficient. For small holes where great accuracy is required the bushing should be brought down close to the work. For drills smaller than No. 31 this dimension may be approximately $^1/_{64}$ in. with drills ground with a flat point.

Jig Latches

In the joint of a latch give the latch the widest possible hold on the hinge-pin. (Fig. 15.)

General

Thumb nuts, fluted nuts, and levers should be used where the quantities are large, as the necessity of handling wrenches is thus

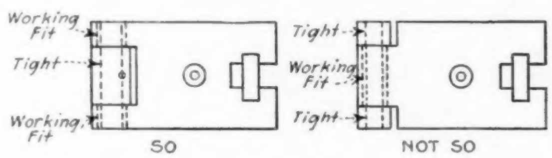

Fig. 15

avoided. They should be large enough to give the required pressure easily. When it becomes necessary for an operator to use a mallet, time is lost and either the work or the fixture is likely to be sprung.

Thumb nuts and hand knobs should have ample clearance around them to permit their being manipulated properly and to avoid possibility of injury. Avoid knurling nuts and handles. When covered with cutting lubricant they are irritating to the operator's hands under constant use.

If it is necessary to use a wrench in setting the work, the various nuts should preferably be of the same size so that change of wrenches is not necessary.

All exposed screws, nuts, and lugs, the motion of which might catch the operator, are to be avoided, and all sharp corners and edges should be removed.

The operator's hands must be well clear of the cutters during the insertion, clamping, and removal of the work.

There should be no danger of destruction of the work, tool, fixture, or machine through the overrunning of the cutter.

The Peak-Load Problems in Steam Power Stations

By A. G. Christie,[1] Baltimore, Md.

This paper deals with the problem of the annual peak load in steam power plants. The use of the load-duration curve for the purpose of studying annual peak loads is analyzed and the conclusions drawn that (1) plant intended for annual-peak-load service should only be installed at the lowest possible first cost, and (2) that economy of peak-load equipment can be sacrificed to secure low initial cost.

Much thought has been devoted to methods of improving the daily load factors of steam-electric power stations. Night loads have been added, power demands for morning and early afternoon hours have been developed, and attention has been given to reducing peak demands which usually occur at about six o'clock in the afternoon. This paper will discuss the problem of carrying the maximum peak loads of the year.

The Load-Duration Curve

The load-duration curve represents the cumulative duration of all loads throughout the year as shown in Fig. 1. Each point of the curve indicates the hours per year that the load has not been less than the kilowatts represented by the point. To plot this curve, the daily load curves are first taken and the average output for each hour of the twenty-four is noted. A record is made of the duration in hours of each load throughout the year. These loads are then plotted in decreasing order from the peak load with a cumulative time as a base, until the loads for the whole

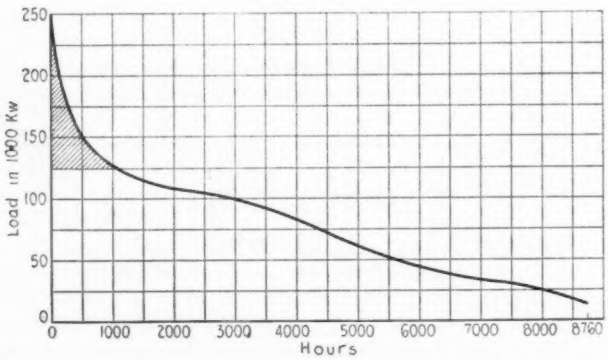

Fig. 1 Load-Duration Curve for System With 30.4 Per Cent Annual Load Factor

8760 hours of the year have been recorded. A smooth curve, or a stepped curve as preferred, drawn through the plotted points, represents the load-duration curve of the particular system.

The area under the curve represents kilowatt-hours output to a given scale, and may be used to check the yearly output computed by other means.

The annual load factor as used in this paper is the ratio of the kilowatt-hours generated to the maximum demanded during the year multiplied by 8760, the total hours per year. This ratio is thus the area under the load-duration curve divided by the area represented by the product of the maximum load of the year and 8760. The annual load factor of that portion of the demand above any given load may be found by taking the ratio of the area under the curve above the given load, to the product of 8760 and the difference between the given load and the maximum peak load. The annual load factor of that portion of the load below any given load is the ratio of the area under the curve between zero load and the given load, to the product of 8760 and the given load. The steeper the load-duration curve, the lower will be the annual load factor, as is indicated by Fig. 1, which has an annual load factor of 30.4 per cent. On the other hand, the

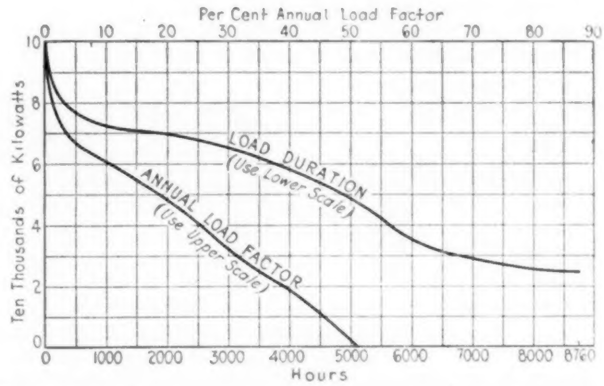

Fig. 2 Load-Duration Curve for System With 51.4 Per Cent Annual Load Factor and Annual-Load-Factor Curve for That Portion of Output Above Given Loads

flatter the load-duration curve and the less it diverges from the flat curve at maximum and minimum load, the higher will be the annual load factor, as shown in Fig. 2, which has an annual load factor of 51.4 per cent.

Loads in excess of 50 per cent of the maximum peak in Fig. 1 occur for only 1050 total hours during the year, while loads in excess of 75 per cent of the maximum peak exist for only 200 hours in the year. The kilowatt-hours generated by the equipment employed to carry load in excess of 50 per cent of the maximum peak and which is shown by the cross-hatched area on the diagram, represents only 4.8 per cent of the total annual output. The equipment carrying load above 75 per cent of the maximum peak in Fig. 1 produced only about 0.5 per cent of the total kilowatt-hours generated. Load in excess of 80 per cent of the maximum peak in Fig. 2 lasts for 320 total hours and develops about 0.62 per cent of the total annual output.

The annual load factor has been plotted in Fig. 2 for that portion of the load above each load. For instance, the annual load factor for that portion of the load in excess of 75 per cent of the maximum peak is 2 per cent, as shown on the upper scale. Also, the annual load factor for that portion of the load in excess of 50 per cent of the maximum peak is 18.6 per cent. This method of drawing the annual load factor for various portions of the maximum peak assists in analyzing the peak-load problem.

A study of load-duration curves leads to the formulation of two statements regarding peak-load equipment in a generating system: (a) Plant intended for peak-load service only should be

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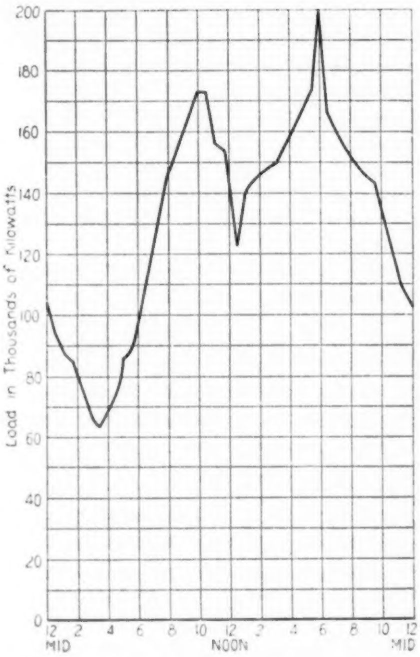

FIG. 3 AVERAGE DAILY LOAD CURVE FOR SYSTEM WITH 65 PER CENT ANNUAL LOAD FACTOR

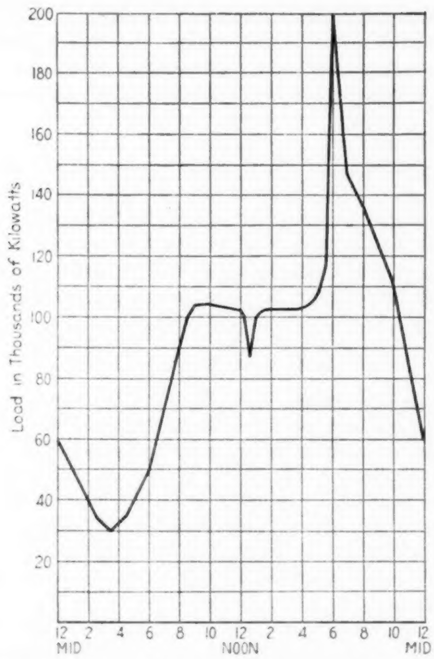

FIG. 5 AVERAGE DAILY LOAD CURVE FOR SYSTEM WITH 45 PER CENT ANNUAL LOAD FACTOR

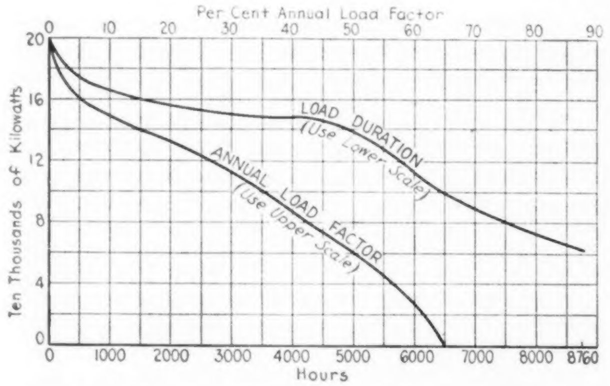

FIG. 4 LOAD-DURATION CURVE AND ANNUAL-LOAD-FACTOR CURVE FOR SYSTEM WITH 65 PER CENT ANNUAL LOAD FACTOR

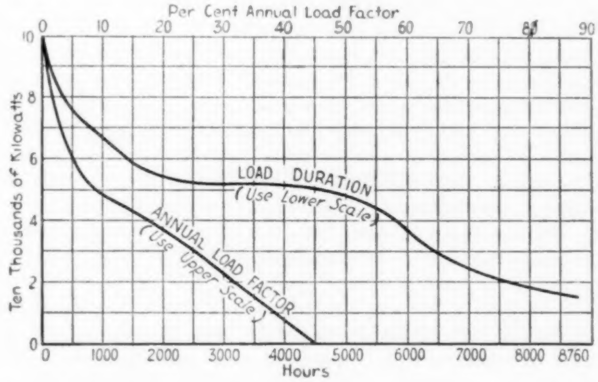

FIG. 6 LOAD-DURATION CURVE AND ANNUAL-LOAD-FACTOR CURVE FOR SYSTEM WITH 45 PER CENT ANNUAL LOAD FACTOR

installed at the lowest possible first cost; (*b*) Economy of peak-load equipment can be sacrificed to secure low initial cost. The first statement is evident from a consideration of the few hours of service of this portion of the system during the year. Only equipment with a low first cost can be justified. The second follows from a consideration of the small amount of power generated by such peak-load equipment. The cost of each kilowatt-hour thus generated consists predominantly of fixed charges, with relatively smaller charges for fuel, labor, and maintenance.

PROPOSED SCHEMES TO CARRY PEAK LOAD

Electrical systems have had such rapid growth that additional generating capacity is needed every few years. The design of power plant and equipment has also developed so that fuel economies are available by the addition of new units. Each new installation has been made the "base-load" plant of the system, although there have been exceptions to this practice. The high load factors of many systems which have well-sustained high loads throughout the greater portion of the day with no short, sharp peaks favor the addition of base-load units.

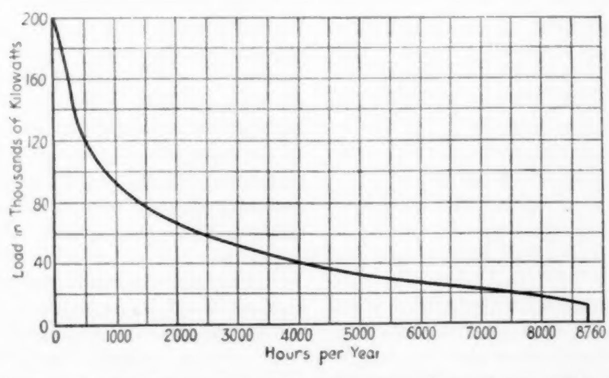

FIG. 7 LOAD-DURATION CURVE FOR 25 PER CENT ANNUAL LOAD FACTOR

Methods of carrying peak loads were discussed at the convention of the Verband Deutscher Electrotechniker at Kiel, Germany, in June, 1927,

and reported in *Elektrotechnische Zeitschrift*, June 30, 1927. High-level water storage, Diesel engines, electric storage batteries, and Ruths steam accumulators were considered in this connection.

Few sites are available in this country where the combination of lack of pondage on the river, low load factor, and nearby available natural storage basins at high head would make an economic possibility of hydraulic storage during off-peak hours for use on peak load. Electric storage batteries are costly and are not generally considered economical equipment to carry system peak loads. The development of large Diesel engines for central-station service has been slow in America due to high first cost, and on this account it is not likely that they will be widely used for peak-load service in the immediate future.

Steam Accumulators

The steam accumulator has been used for many years both here and abroad for service with exhaust steam from reciprocating engines, and its operation is well understood by engineers. A Swedish engineer, Dr. J. Ruths, applied the principle of steam storage to accumulators for large quantities of steam by making the pressure vary between wide limits—for instance, from 250 to 50 lb. per sq. in. gage. In the following discussion the use of the term "steam accumulator" will refer to one of this high-pressure type.

The steam accumulator finds economic justification in power plants to take violent load fluctuations of short duration, to enable the plant to economically carry sharp daily peak loads, and to carry a portion of the annual peak load.

Steam turbines for accumulators are usually operated on saturated steam at moderate pressures, which permits the use of cast-iron casings. The low annual load factors for peak-load service will not warrant refinements in the design of turbine or condenser plant, and these for use with accumulators should be little, if any, more expensive than similar plant for peak-load service at standard pressures. Some operating advantages may be secured at slight additional cost by making the accumulator turbine a mixed-pressure turbine capable of operating steadily in emergencies on steam direct from the boilers, or desuperheated.

Steam accumulators are suitable for peak-load service when the peaks are sharp and of short duration. The Siemens-Schuckert Werke of Berlin, Germany, have recently received an order from B.E.W.A.G., the electricity works of that city, to install 16 Ruths accumulators in connection with the Charlottenburg Station, one of the older plants of the system. Vertical accumulators each 69 ft. high, 14 ft. 9 in. in diameter, and with a capacity of about 11,000 cu. ft. will be added. These will stand in the open with no housing, and in appearance will resemble a group of Cowper stoves. They will have a steam capacity sufficient to carry a 40,000-kw. peak with a three-hour base on two turbines each of 20,000-kw. capacity, and to generate 67,000 kw-hr. during this period. The boilers of the plant will supply steam to these accumulators at night and during drops in the day demand. This service will increase not only the load factors on the boilers, but also, as the accumulators float on the line, the rate of driving the boilers will become more constant, resulting in an increase in boiler-plant efficiency. The accumulator equipment will take the top portion of the Berlin daily peak, which has become very sharp, and thus permit other stations to operate on higher load factors with improved performance.

Other Steam Plant for Peak Load

Old stations on a power system often offer possibilities of increased capacity for peak-load service. Many have stokers with low settings and old equipment. Some of these may be changed to powdered-coal firing with unit mills, water-cooled furnace walls, evaporators, air preheaters, and radiant-type superheaters, and the output of the boiler plant can thus be greatly increased during peak loads. If adequate cooling water is available, the old turbines may be rebuilt for greater steam capacity at peak load. Small turbines may be replaced by new, larger, peak-load units. Generators may also be rewound for added capacity, or may be replaced by units of larger output. Such changes will materially increase the capacity of an old plant as a peak-load station, and the resultant gain in system capacity may be secured at a lower total cost than by any other plant which will provide the same additional capacity.

When new and highly economical boilers and turbines are added to a power system and are operated as base-load units during the early years of their use, the capacity factors of the older equipment are decreased. The question now arises whether the installation of cheap, rugged units of large capacity for peak-load service only, in place of highly efficient base-load units, would be economically justified. It is also desirable to determine whether such peak-load units would provide lower costs than steam-accumulator plant.

These peak-load turbines are of simple design and moderate efficiency so that as great an output as possible may be secured from a given frame, thus lowering the first cost per kilowatt of capacity. Condenser equipment for moderate vacuum may be installed. Peak-load boilers could be either oil fired or provided with water-cooled walls, large furnaces, and unit pulverizers for quick starting, low stand-by costs, and maximum ratings during their short daily periods of operation.

Economics of Methods of Carrying Peak Loads

In order to make some concrete comparisons of the relative economy of steam accumulators, base-load units, and peak-load units, the average daily load curves for a year (for 65 per cent annual load factor and for 45 per cent annual load factor) of a plant with a total capacity of 200,000 kw. have been asssumed from data in A. H. Markwart's paper "Power in California."[2] The corresponding load-duration and annual-load-factor curves are shown in Figs. 4 and 6. A load-duration curve, Fig. 7, was drawn for 25 per cent annual load factor from other available data.

The following plant costs were assumed for the purposes of this discussion:

Peak-load plant complete	$85 per kw. capacity
Standard plant complete	$100 per kw. capacity
Base-load plant complete with latest heat-saving equipment	$115 per kw. capacity

The steam-accumulator plant can be as simple in the turbine room as the peak-load plant. Its cost exclusive of the accumulator was taken as $55 per kw. of capacity. Accumulators with their foundations and piping were assumed to cost $17 per kw-hr. of maximum charging capacity. The cost of accumulator plant in the following calculation was based on an arbitrary assumption that the maximum daily peaks of the year to be carried by the accumulators would have a time base twice as great as that shown by Figs. 3 and 5, which are average daily load curves. Hence for a given portion of the peak load, the daily storage capacity of the accumulator was assumed to be twice the kilowatt-hours shown by that portion of the average daily load curve. Similar assumptions were made in the calculations for 25 per cent load factor. These assumptions were made for the purpose of this paper only. In an actual case the daily load curve for that day on which the maximum yearly peak occurs should be used to calculate the necessary kilowatt-hour capacity of the accumulator.

The influence of variations in these prices will be discussed later. Fixed charges were assumed for all systems to be as

[2] *Jl. Franklin Inst.*, Aug., 1927.

follows: interest, 6 per cent; taxes, insurance, etc., 3 per cent; depreciation, 6 per cent; total, 15 per cent. Coal of 12,500 B.t.u. per lb. as fired was assumed at a cost of $5 per ton of 2000 lb.

The standard plant equipment to which additions are to be made was assumed to approximate recent practice. The variation in heat rate with load factor of such standard plant, as expressed in B.t.u. per kw-hr., is given by curve A, Fig. 8, and is expressed by the formula

$$\text{B.t.u. per kw-hr.} = 13{,}600 + \frac{100{,}000}{\text{Annual load factor in per cent}}$$

The steam leaving the accumulator will not be superheated. For the purpose of this paper, gage-pressure limits of 200 lb. to 20 lb. will be assumed on the accumulators, and an average steam consumption of 20 lb. per kw-hr. on the turbine. An allowance of 12.5 per cent will be added to take care of auxiliary power, radiation losses from the accumulators, and steam required to start up the turbine. The accumulator plant would therefore require 22.5 lb. of steam per kw-hr. net output. Assume that at night the boilers add 1000 B.t.u. per lb. to generate this steam at an efficiency of only 75 per cent. The average heat requirements of the accumulator plant will be $(22.5 \times 1000)/0.75 = 30{,}000$ B.t.u. per net kw-hr., which seems a liberal figure.

A special turbine and boiler plant, for peak-load service only, would be added to the standard plant where the steam conditions may be assumed as 400 lb. gage, 700 deg. fahr. The condenser could be designed for 28 in. of vacuum. The average steam consumption under these conditions was assumed to be 11 lb. per kw-hr. An allowance of 12.5 per cent additional steam at average load was made for auxiliaries and for losses in starting up. If 1200 B.t.u. are added per pound of steam in a boiler built for large capacity rather than for economy, and which operates at an average efficiency of only 65 per cent, the average B.t.u. per net kw-hr. output will be $11 \times 1.125 \times (1200/0.65) = 22{,}850$ B.t.u.

The base-load units will be assumed to operate with high pressure, high superheat, bleeders, low vacuum, and air preheaters or economizers to insure high plant economy. The performance of such a base-load unit is given in curve B, Fig. 8. and is expressed by the formula

$$\text{B.t.u. per kw-hr.} = 12{,}900 + \frac{100{,}000}{\text{Annual load factor in per cent}}$$

Additional plant operators for steam-accumulator, peak-load, and base-load units are provided at the rate of 60 cents per hour. The steam accumulator is entirely automatic and requires little attention. Its turbine will require an operator for a single shift of 8 hours per day during the peak load. If used for annual peak only, this operator need not be employed for the whole year. The peak-load plant is assumed to operate only during a single 8-hour shift with two additional operators, one in the boiler room and one in the turbine room. The base-load unit operates the full 24 hours and two additional operators per 8-hour shift are provided, one for the boilers and one for the turbine. When the added unit exceeds 40,000 kw., it has been assumed that adjustments will be made in the labor force of the original station so that no additional operators other than those just mentioned will be required in any new plant.

The assumption has also been made that no plant operates at a higher annual load factor than 80 per cent. This provision allows ample time for condenser cleaning, boiler and turbine maintenance, general inspection, and overhauling.

The following comparisons will be based only on fixed charges and fuel costs with the additional labor. It is assumed that repairs and maintenance, attendance, supervision, and other charges will remain substantially constant in all cases, and they are therefore not included in the comparisons, although it would appear that these charges should be less for accumulators than for boilers.

STEAM ACCUMULATORS VS. BASE-LOAD UNITS

To show the method by which the following analyses were made, a 20,000-kw. accumulator plant is assumed in Case 1 to take the top 20,000 kw. of the maximum peak of 200,000 kw. of the 65 per cent annual-load-factor curve shown in Figs. 3 and 4. This will be compared with a base-load unit of 20,000-kw. capacity also applied to the load curves of Figs. 3 and 4 which will operate with an 80 per cent annual load factor. The standard plant is assumed to carry the remaining portion of the load in each case. The comparison of yearly costs is as follows:

CASE 1—STEAM ACCUMULATORS VS. BASE-LOAD UNITS, COMPARISON OF YEARLY COSTS

Steam Accumulator Plant (20,000 kw., cost $67 per kw.):		
Fixed charges, 0.15 × 20,000 × $67	=	$201,000
Fuel at 1.5 per cent annual load factor (30,000 B.t.u. per kw-hr.) = 0.015 × 8760 × 20,000 × $\frac{30{,}000}{12{,}500} \times \frac{\$5.00}{2000}$	=	15,768
Standard Plant (180,000 kw.):		
Fixed charges, 0.15 × 180,000 × $100	=	2,700,000
Fuel at 72.2 per cent annual load factor (14,985 B.t.u. per kw-hr.) = 0.722 × 8760 × 180,000 × $\frac{14{,}985}{12{,}500} \times \frac{\$5.00}{2000}$	=	3,411,933
1 extra operator, $0.60 × 2920	=	1,752
Total annual cost		$6,330,453
Base-Load Unit (20,000 kw.):		
Fixed charges, 0.15 × 20,000 × $115	=	$345,000
Fuel at 80 per cent annual load factor (14,150 B.t.u. per kw-hr.) = 0.80 × 8760 × 20,000 × $\frac{14{,}150}{12{,}500} \times \frac{\$5.00}{2000}$	=	396,653
Total kw-hr. generated (*a*) = 0.65 × 8760 × 200,000 = 1,138,800,000		
Total kw-hr. on base-load unit (*b*) = 0.80 × 8760 × 20,000 = 140,160,000		
Total kw-hr. on standard plant = (*a*) — (*b*) = 998,640,000		
Annual load factor, standard plant $= \frac{998{,}640{,}000}{180{,}000 \times 8760} = 63.33$ per cent		
Standard Plant (180,000 kw.):		
Fixed charges, 0.15 × 180,000 × $100	=	2,700,000
Fuel at 63.33 per cent annual load factor (15,180 B.t.u. per kw-hr.) = 0.6333 × 8760 × 180,000 $\times \frac{15{,}180}{12{,}500} \times \frac{\$5.00}{2000}$	=	3,031,711
6 extra operators, 6 × $0.60 × 2920	=	10,512
Total annual cost with base-load unit		$6,483,876
Total annual cost, using steam accumulator		6,330,453
Annual saving by the use of steam-accumulator plant above fixed charges		$153,423

Table 1 presents Case 1 in tabular form together with Cases 2 and 3 for sizes of accumulator plants and base-load plants up to 40,000 kw. calculated for 65 per cent annual load factor as per Figs. 3 and 4. Two operators are provided for the accumulator plants in Cases 2 and 3, since these would have to operate for a portion of two shifts during the annual peak loads. The annual savings above fixed charges with coal at $5 per ton as shown in Table 1 are shown graphically by curve A, Fig. 9. The annual savings with coal at $4 per ton are shown by curve A, Fig. 10. Calculations were made in the same manner for the

addition of steam accumulators or base-load plant to standard plant in systems with annual load factors of 45 and 25 per cent as shown by Figs. 6 and 7. The annual savings under these conditions with both $5 and $4 coal are shown by curves A in Figs. 11, 12, 13, and 14.

The annual savings above fixed charges that appear possible by the use of steam-accumulator plant, as shown by these tables and curves, are of such magnitude that an analysis will be made of the effect on the final results of changes in the assumptions on which the calculations are based.

In Case 1, if the first cost of the complete accumulator plant were increased as much as 25 per cent, the annual saving would still be $103,173. Doubling the fuel consumption for the steam accumulator would decrease the saving only $15,768. Hence considerable variations in the initial cost and fuel costs of the accumulator plant will not wipe out its net savings. The effect of a change in the price of coal is variable, as can be seen by comparing points on curves A in Figs. 9, 11, and 13 for $5-per-ton coal with similar points on curves A in Figs. 10, 12, and 14 for $4-per-ton coal. An increase in coal price of $1 per ton will cause similar variations in savings in the opposite direction. It is interesting to note that in the case of standard plants the effect of variations in coal cost is small over the ranges of size of accumulator plant that would probably be installed.

Considering the base-load unit in Case 1, a decrease in first cost to $100 per kw. will reduce its total costs $45,000. Even a 10 per cent reduction in heat consumption, resulting from higher boiler pressure and reheating, would only lessen total costs by $39,665. Normal variations in the costs of the base-load unit will not lower these costs to those of the accumulator.

TABLE 1 STEAM-ACCUMULATOR PLANT VS. BASE-LOAD PLANT FOR 65 PER CENT ANNUAL LOAD FACTOR AS PER FIGS. 3 AND 4 WITH COAL AT $5 PER TON

	Case 1, 20,000 kw.		Case 2, 30,000 kw.		Case 3, 40,000 kw.	
Steam-Accumulator Plant:						
Cost per kw	$67		$77		$87.50	
Fixed charges		$201,000		$346,500		$525,000
B.t.u. per kw-hr	30,000		30,000		30,000	
Annual load factor, per cent	1.5		2.7		5.2	
Fuel costs		15,768		42,574		109,325
Standard Plant:						
Capacity, kw	180,000		170,000		160,000	
Fixed charges		2,700,000		2,550,000		2,400,000
Annual load factor, per cent	72.2		76.2		80.0	
B.t.u. per kw-hr	14,985		14,910		14,850	
Fuel costs		3,411,933		3,383,885		3,330,202
Extra operators	1	1,752	2	3,504	2	3,504
Total		$6,330,453		$6,326,463		$6,368,031
Base-Load Plant:						
Capacity, kw	20,000		30,000		40,000	
Fixed charges		345,000		517,500		690,000
Annual load factor, per cent	80		80		80	
B.t.u. per kw-hr	14,150		14,150		14,150	
Fuel costs		396,653		594,979		793,306
Standard Plant:						
Capacity, kw	180,000		170,000		160,000	
Fixed charges		2,700,000		2,550,000		2,400,000
Annual load factor, per cent	63.33		62.35		61.25	
B.t.u. per kw-hr	15,180		15,200		15,230	
Fuel costs		3,031,711		2,822,689		2,614,930
Extra operators	6	10,512	6	10,512	6	10,512
Total		$6,483,876		$6,495,680		$6,508,748
Annual saving by use of accumulator plant in place of base-load plant with coal at $5 per ton		$153,423		$169,217		$140,717
Annual saving with coal at $4 per ton		153,290		170,975		146,975

Another factor is the variable element in the assumed heat rates. In the case of the base-load plant it is obvious that if the variable element is reduced, the coal cost of the base-load plant will also be reduced and the annual savings by accumulator or peak-load plant would be correspondingly reduced. For instance, if the variable factor is changed so that the heat rate of the base-load plant becomes

$$\text{B.t.u. per kw-hr.} = 12{,}900 + \frac{80{,}000}{\text{Annual load factor in per cent}}$$

the base-load station's performance with 80 per cent annual load factor becomes 13,900 B.t.u. per kw-hr., a saving of (14,150—13,900)/14,150 = 1.77 per cent of its fuel cost. Except for the larger base-load plants this will have little effect on the final results shown by curve A in the various figures. If the variable factor of the heat rate of the standard plant is changed to

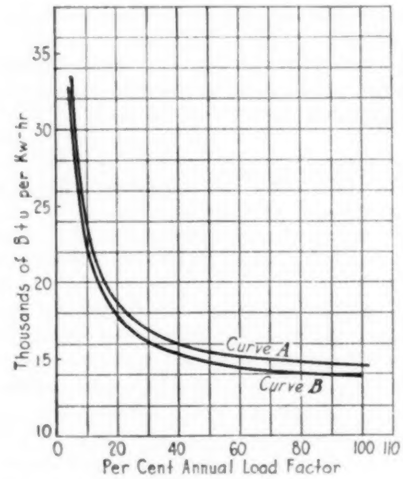

Fig. 8 Relation of B.t.u. per Kw-Hr. to Annual Load Factor

$$\text{B.t.u. per kw-hr.} = 13{,}600 + \frac{80{,}000}{\text{Annual load factor in per cent}}$$

the annual saving in Case 1 would decrease $267. Calculations on the assumed plants indicate that reasonable changes in the assumed variable factor of the heat-rate equations for the standard plant, have no important effect on the annual savings of steam-accumulator plants.

Peak-Load Units vs. Base-Load Units

Calculations were made to determine the annual savings above fixed charges resulting from the addition of various sizes of peak-load plant in place of base-load plants. These savings are shown by the dotted curves B in Figs. 9 to 14. The difference between curve A and curve B in each case represents the difference in annual savings between the accumulator plant and the peak-load plant. This difference remains constant for a given size of accumulator and peak-load plant at a given load factor.

Curves A and B indicate the possibility of further savings with 25 and 45 per cent annual load factors from a combination of accumulator and peak-load plants. The annual savings from a number of these combinations are indicated by curves C in Figs. 11 to 14.

These data indicate that the addition of peak-load plant effects no additional saving until the economic capacity of the accumulator plant is exceeded by the combined capacity of accumulator and peak-load equipment.

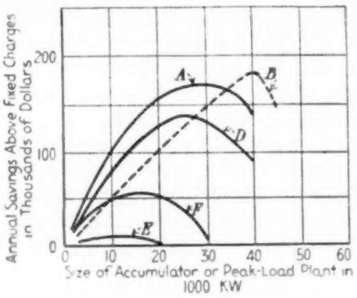

Fig. 9 Savings with 65 per cent annual load factor and $5 coal

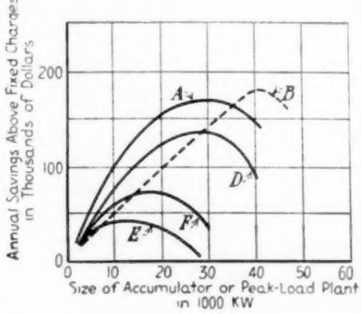

Fig. 10 Savings with 65 per cent annual load factor and $4 coal

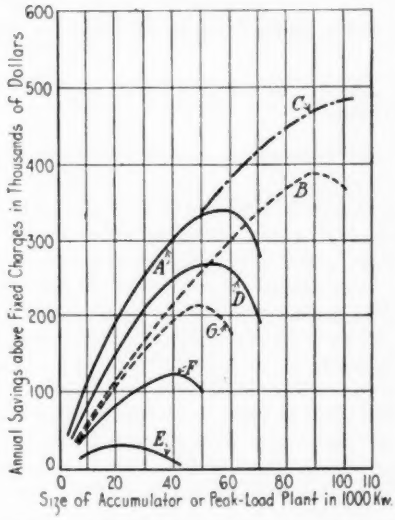

Fig. 11 Savings with 45 per cent annual load factor and $5 coal

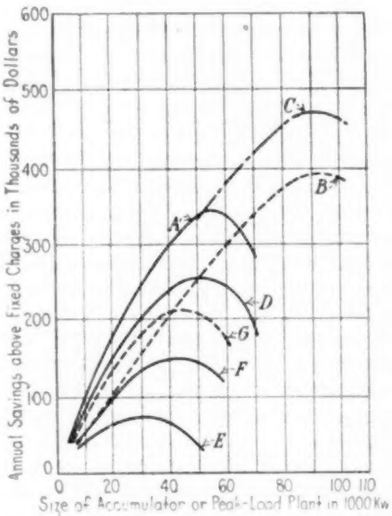

Fig. 12 Savings with 45 per cent annual load factor and $4 coal

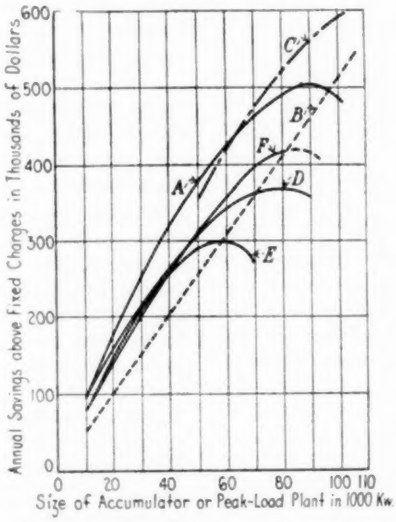

Fig. 13 Savings with 25 per cent annual load factor and $5 coal

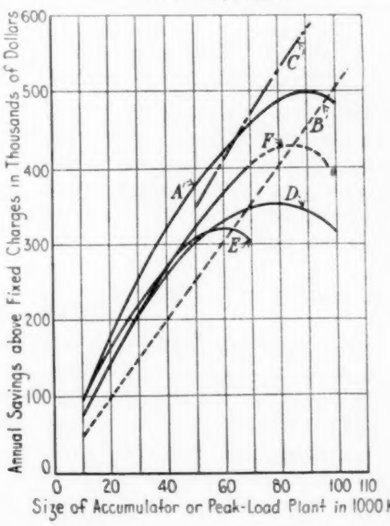

Fig. 14 Savings with 25 per cent annual load factor and $4 coal

Figs. 9–14 Annual Savings Above Fixed Charges Through the Use of Steam-Accumulator Plant or Peak-Load Unit on a 200,000-Kw. System

Curve A—Annual savings, steam accumulator over addition of base-load plant to standard plant.
Curve B—Annual savings, peak-load unit over addition of base-load plant to standard plant.
Curve C—Annual savings, combined accumulator and peak-load plant over addition of base-load plant to standard plant.
Curve D—Annual savings, steam accumulator over addition of standard unit to standard plant.
Curve E—Annual savings, steam accumulator over addition of base-load unit to system with standard plant and old low-efficiency plant.
Curve F—Annual savings, steam accumulator over addition of base-load unit to system with standard plant together with older plant of moderate efficiency and still older plant of low efficiency.
Curve G—Annual savings, steam accumulator over addition of base-load unit to system with a series of units with efficiencies decreasing from the standard plant to the very old plant.

Note: **The differential between curves A and B at any size of accumulator or peak-load unit remains constant for that particular size. Curves have not been drawn for annual savings with peak-load units for conditions represented by curves D, E, F, and G, as this would confuse the diagrams. The savings by the use of peak-load units with these combinations can be found by deducting the differential between curves A and B from the curve of accumulator savings for the particular system in question.**

Steam Accumulators vs. Additional Standard Plant

Instead of adding a base-load unit to the system another unit may be added at the same cost and efficiency as those of the assumed standard plant. The annual savings that may be effected by the installation of a similar capacity of steam-accumulator plant to carry peak loads over the new standard unit are shown by curves D in Figs. 9 to 14.

Steam Accumulators on Systems With Standard and Old Plants

The figures having the greatest influence on the savings are the differences in the fixed charges of the accumulator or peak-load plant and the equivalent capacity of base-load plant. These differences will vary with the assumed plant costs. The next important influence is the saving in coal costs when load is transferred from one plant to another after the installation of the base-load plant. In the plants assumed in curves A, B, C, and D the differences in B.t.u. per kw-hr. between base-load plant and standard plant are not very great. Many electrical systems, however, are supplied from both modern and older stations which which may have wide differences in heat rates. Consequently the shifts of loads between such stations when a base-load unit is added may result in a large saving in coal. If the relative sizes of old and modern standard plants in relation to the load-duration curve are such that this shift of load represents a large number of kilowatt-hours, the saving in coal costs by the installation of a base-load unit may offset, in a large measure, the savings in fixed charges that so greatly favor accumulator and peak-load plants.

An assumption was made that a system consisted of a certain capacity of standard plant whose station heat rate as before was represented by the formula

$$\text{B.t.u. per kw-hr.} = 13{,}600 + \frac{100{,}000}{\text{Annual load factor in per cent}}$$

together with certain capacity of old plant with a heat rate as follows:

$$\text{B.t.u. per kw-hr.} = 19{,}000 + \frac{105{,}000}{\text{Annual load factor in per cent}}$$

A transfer of a kilowatt-hour of load from the old station to the standard plant, resulting from the installation of base-load plant, produces a coal saving of at least 0.4 lb. The annual savings that would result from the installation of an accumulator plant in place of a base-load plant, in a system with various combinations of standard and old plant with heat rates as above, are shown by curves E in Figs. 9 to 14. The value of the fuel saved by the shifts of load resulting from the installation of a base-load plant in such systems with high load factors offsets the advantage of lower fixed charges with accumulator plant, and leads to little or no net saving. With low load factors, however, this fuel saving is of less value, for fewer kilowatt-hours are involved in the shift of load, and the annual savings above fixed charges by the use of accumulator plant in place of base-load plant are large, as shown by curves E in Figs. 13 and 14.

Steam Accumulators on Systems With Mixed Plants

Many electrical systems do not have such wide variations between the heat rates of the old and the standard plant as in the preceding paragraph. Others may contain some plant with a heat rate intermediate between that assumed for the old and standard plant. Calculations were made to show the effect of the introduction of such plant, known as "medium plant," with a heat rate as follows:

$$\text{B.t.u. per kw-hr.} = 16{,}300 + \frac{100{,}000}{\text{Annual load factor in per cent}}$$

The annual savings above fixed charges resulting from the installation of accumulator plant in place of base-load plant in such a system are plotted in curves F, Figs. 9 to 14, and show a substantial increase over the savings shown in curves E. If the variations in heat rate were less extreme than those assumed and more intermediate plants employed, calculations indicate that the savings by the use of accumulator or peak-load plant in place of base-load plant will exceed those shown by curves F. This condition is approximated in many electrical systems where the operating equipment ranges from small, low-efficiency turbines and boilers, progressively up to the most modern highly efficient units. There are so many possible combinations of such plant with varying heat rates that many different costs may be obtained. Annual savings by the accumulator plant in one of these combinations are shown by curves G, Figs. 11 and 12. Calculations indicated that there could be a considerable variation in the proportions of the standard and older equipment for a given size of accumulator or base-load plant, without appreciably affecting the savings shown by curves E, F, and G, Figs. 9 to 14.

Attention has already been called to the differential between the annual savings of the accumulator and peak-load plant of a given capacity, which for given load factors, coal costs, and capacities of units is shown by the distance between the curves A and B. This differential at the same accumulator or peak-load unit capacity can be applied to curves D, E, F, and G in the respective figures if the annual savings by the use of peak-load units with these various combinations are desired.

Conclusions

With the assumed cost data and a triangular peak, the steam accumulator loses its advantage if the base of the peak that it is to carry exceeds four hours. These studies have been made on load curves with sharp annual peak loads such as occur in some cities with large lighting loads. Calculations indicate that peak-load units are less economical than an accumulator plant except in the large sizes. On the other hand, the availability of peak-load units for emergency service, particularly in the case of long-sustained peak loads on dark days, is greater than that of the accumulator. The same degree of availability may be secured on the accumulator turbine by making it a mixed-pressure unit.

The load-duration curves of systems with broad, flat daily peaks may show a certain portion of the annual peak which has a low annual load factor. The long duration of such daily peaks will favor the installation of a peak-load plant in preference to steam accumulators.

A steam-accumulator plant could carry peak loads other than during the annual peak, and this would lead to station economies due to the operation of few boilers and standard turbines. The charged accumulator is also available for emergencies during off-peak hours such as thunderstorm peaks, fog, etc. The charging of the accumulator with steam during the night would improve the load on the boilers, and this should lead to more efficient boiler-house operation during that period. Accumulators require little maintenance and repairs, and this cost will be less than for the equivalent capacity of the boiler plant. Accumulators are subject to little wear and tear, hence their rate of depreciation should be less that that of a similar capacity of boiler plant. No financial credit has been given to the accumulator plant in this paper for any of these savings, although it is reasonable to expect that these may be of a substantial size. The annual savings shown by the various curves refer only to the annual peak load of the system.

The accumulator, with its lower first costs, saves in fixed charges. The base-load plant saves fuel. The net savings depend on the relative values of these two savings, and as shown by the various curves given in the paper, may amount to a large sum of money.

An important point shown by curves A, B, C, and D in the various figures is that steam accumulators and peak-load units effect their largest savings when added to a system consisting of standard plant with modern equipment only. Accumulators have usually been considered for addition to systems with older plants, whereas this study indicates that they can effect the largest savings when applied to systems with the most modern plants, provided these carry shape peak loads.

A second striking fact is the large margin of saving that may be secured by the use of accumulators in place of base-load plant to carry annual peaks with a plant combination when the annual load factors are low.

A third point of interest is that the lower the price of coal the larger the accumulator savings in systems with old and mixed plants, as shown by comparing the curves for different coal prices. This results from the fact that the value of the fuel saving effected by the addition of base-load units is less with low-priced coal than with expensive coal.

It is well to bear in mind in studying the figures presented in this paper that the results refer specifically to the assumed data. In conclusion, while these studies do not consider all possible cases of annual peak loads, they will direct attention to the importance of considering methods of carrying such peak loads and the possible place of steam accumulators and peak-load units in modern central stations. Since each system is a problem in itself, and should be considered separately, this paper may suggest ways of studying the peak-load problems of various power systems.

The Schmidt High-Pressure Locomotive of the German State Railway Company

Details and Road-Test Data of a Locomotive Having a Boiler Which Generates Steam at Two Pressures, 850 Lb. and 205 Lb., Using the 850-Lb. in a Center Cylinder and Its Exhaust Mixed With the 205-Lb. Steam, in Two Outside Cylinders

By R. P. Wagner,[1] Berlin, Germany

Although this locomotive has been mentioned in engineering publications at various times, it nevertheless seems best to preface the description of its present status with an account of the Schmidt process of generating and utilizing high-pressure steam, which neither calls for unattainable qualities of material nor increases the weight of the boiler to such an extent as to make it useless for locomotive purposes.

The Schmidt Indirect Steam-Generating Method

The high evaporation temperatures at high pressures (525 deg. fahr. at 850 lb. and 588 deg. at 1500 lb.) made it advisable not to expose the most sensitive part of the boiler, the drum, to direct radiation, where its walls might become heated above the evaporation temperature. This Schmidt accomplished by introducing his system of indirect heating, Fig. 1. A tube system a is exposed to hot combustion gases or preferably to radiant heat. This system is filled with distilled water, and the steam generated therein rises into the cooling coil B in the high-pressure boiler A. In this coil the steam is condensed, transferring its heat to the water of the boiler, and the condensate flows to the bottom of the system through downcomers not exposed to the heat. The system is self-contained and the quantity of water in it never varies except in case of leakage. When the boiler water reaches the boiling point and further heat is transmitted to it, naturally steam is generated and pressure is developed. As the heating system is continuously receiving heat from the furnace and is entirely enclosed, the pressure in it rises higher than that in the boiler, and the difference between the two pressures is such as to provide for a sufficient drop in temperature between the cooling coil and the boiler water. Thus a certain pressure in heating system (about 1360 lb.) is coordinated with a boiler pressure of 850 lb. for a given area of coil surface and a given quantity of heat transferred. No safety valve is necessary in the heating system, because if more heat is absorbed by it than intended, the pressure rises slightly above 1360 lb. and consequently the temperature increases, the result being that more steam is generated in the boiler, which is either consumed in the cylinders or blown off through the boiler safety valve.

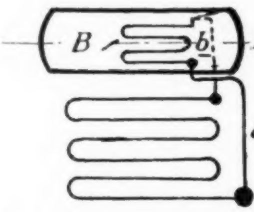

Fig. 1 Scheme of Indirect Heating System

Application to Locomotive Firebox

This steam-generating system, which owing to its simplicity is less subject to failure than most other circulating systems, lends itself very advantageously to the design of a locomotive firebox. Referring to Fig. 2, the heating system forms the walls of a water-tube firebox; the tubes rise vertically from water chambers at the bottom up to the level of the crown sheet. There half of them discharge the rising mixture of water and steam into collecting chambers parallel to the boiler, while the others are bent horizontally, and discharge into the collecting chambers on the opposite side. Firebrick are laid over this archwork to prevent radiant heat and combustion gases from reaching the boiler drum, which is arranged longitudinally above the firebox. In the collecting chambers the steam is separated from the entrained water, and from their upper parts tubes lead to the coils inside the boiler. The tubes carrying the condensate back to the water chambers at the bottom are so arranged as not to be exposed to radiation and gas circulation.

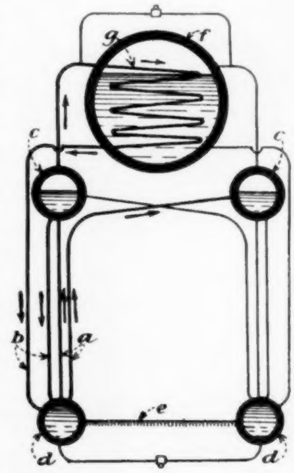

Fig. 2 Diagram Showing Arrangement of Schmidt High-Pressure Locomotive Firebox

(a, steam-generating tubes; b, downcomers; c, upper collecting chambers; d, bottom water chambers; e, furnace; f, 850-lb. boiler drum; g, heating units.)

This system has proved itself to be a thoroughly reliable one for heating a high-pressure boiler, but it should be borne in mind that it is a far cry from a heating system to a locomotive ready for service.

On the advice of the Schmidt Superheater Company to the author's department the locomotive was provided with a low-pressure boiler, into which the feedwater is first pumped. This boiler is of the ordinary tubular type and carries 205 lb. pressure. In it the feedwater is heated far enough above the temperature at which scale is precipitated to insure practically complete precipitation. From this boiler the feedwater is pumped over into the high-pressure boiler, carrying with it only a small percentage of suspended matter which forms a harmless mud that can be easily removed from the coils by blowing off.

Cleaning the feedwater, though, is not the only advantage of the tubular boiler. Instead of a throat sheet its rear end is a circular tube plate, and the combustion gases are sent through a system of flues like those of an ordinary locomotive boiler into the front end. Their heat is partly used for raising steam at 205 lb. pressure, and partly for superheating both the high-pressure and low-pressure steam. A pressure of 850 lb. necessitates the use of a compound engine and resuperheating of the receiver steam; on the other hand, a receiver superheater would accumulate more or less lubricating oil entrained from the high-pressure cylinders, and clog up with oil coke. For this reason the low-pressure boiler has been designed so as to produce about 40

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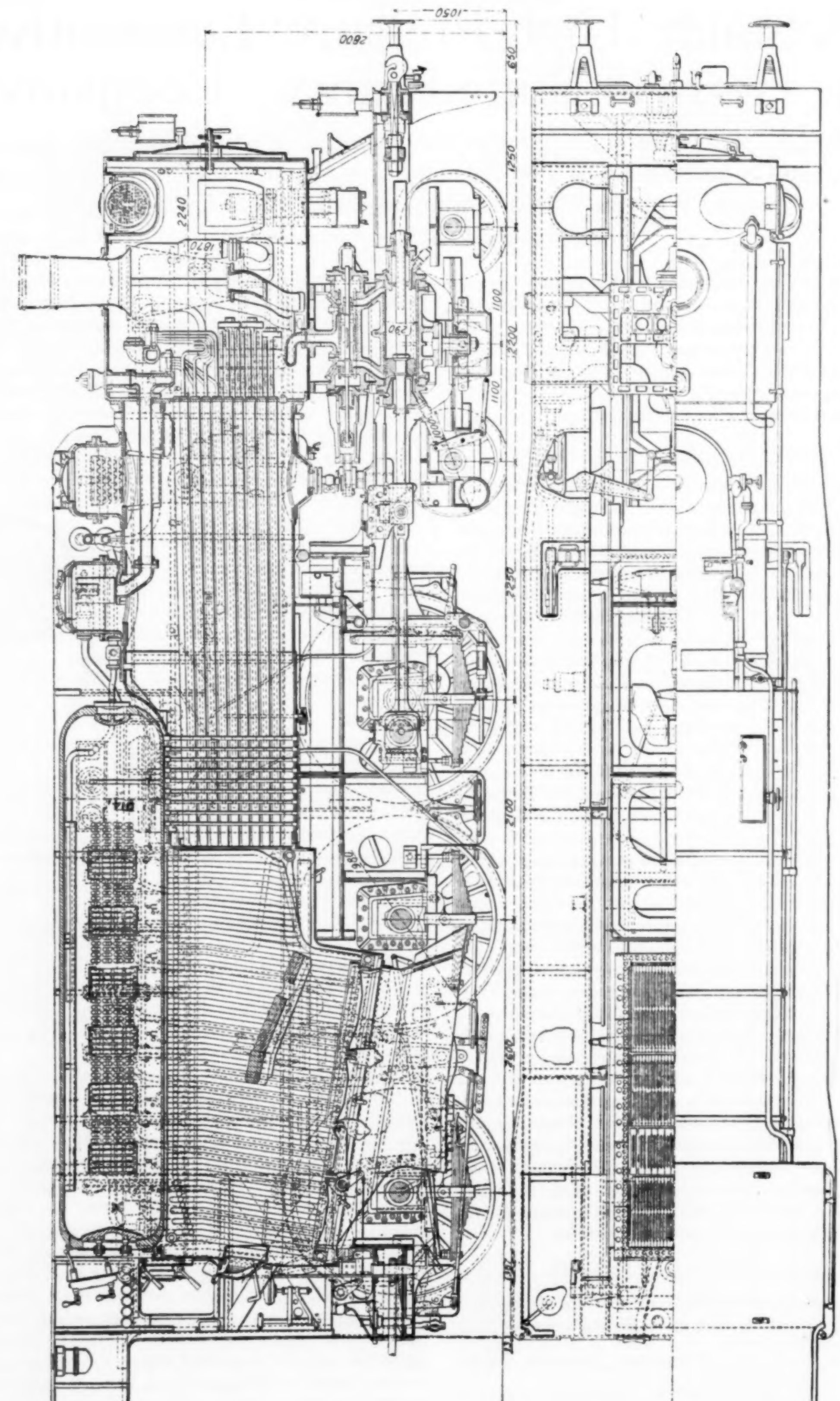
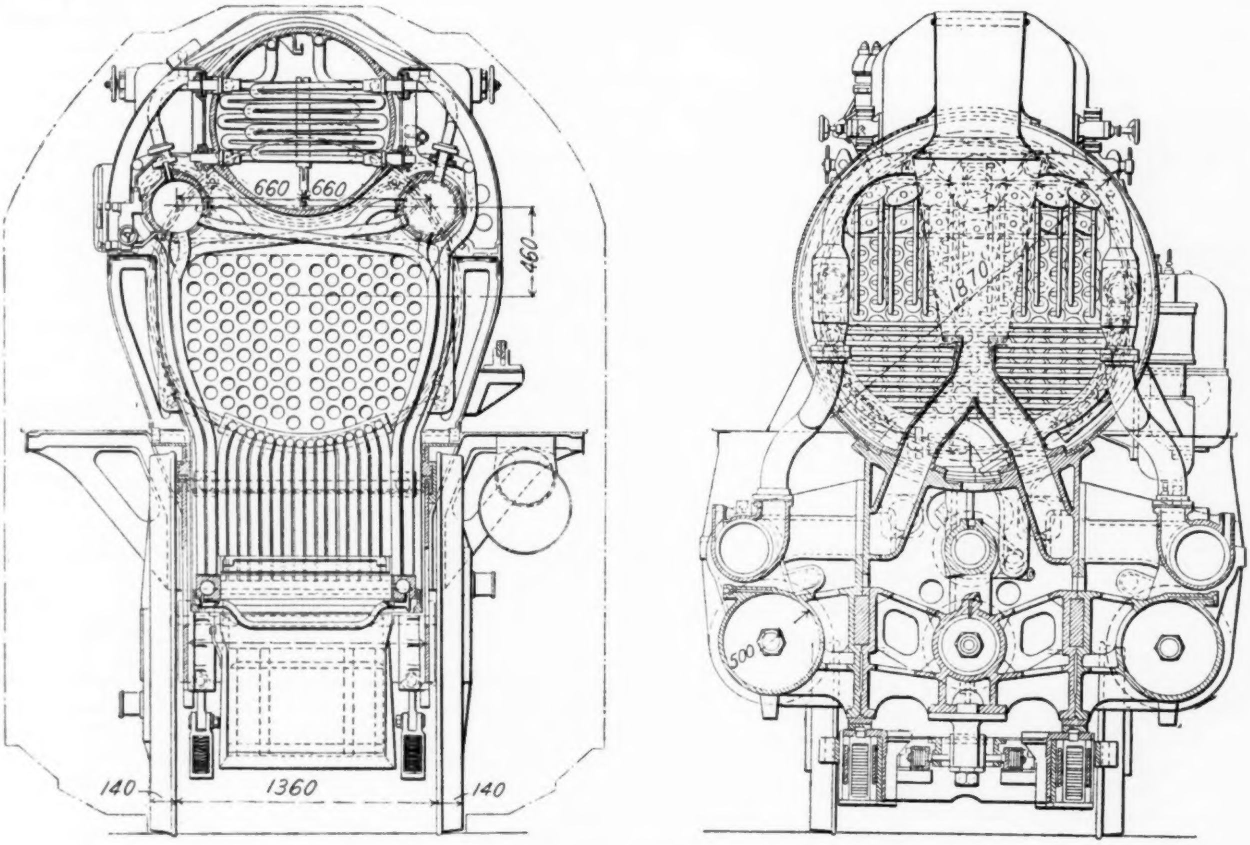


Fig. 3 Sectional Plan and Elevation of Schmidt High-Pressure Locomotive



FIGS. 4 AND 5 VERTICAL CROSS-SECTIONS OF SCHMIDT HIGH-PRESSURE LOCOMOTIVE

per cent of the total steam generated. A small portion of this steam is used for the auxiliaries, which it seemed wise to run on low pressure. The major part, however, is highly superheated and mixed with the fairly well saturated exhaust from the high-pressure engine, thus resuperheating it without sending it through a superheater.

It was along these lines that the final design of the locomotive was built in the shops of Messrs. Henschel & Sohn, Cassel, Germany. For testing the system it seemed sufficient to put a test boiler upon an existing locomotive. One of the older types of the German State Railway Company, a 4-6-0 high-speed passenger locomotive, seemed especially suitable, as it carried three cylinders and could be easily compounded by converting one of them into a high-pressure cylinder. As two-thirds of all the steam is generated at high pressure and roughly half of the steam energy is utilized in the high-pressure part of a compound engine, one-third of the entire work should be performed by the high-pressure cylinder. For this reason a three-cylinder locomotive was chosen for conversion.

GENERAL DESCRIPTION OF LOCOMOTIVE

The general data of this locomotive are as follows:

Engine

Cylinder diameters:	
High-pressure	$11^7/_{16}$ in.
Low-pressure (2 cylinders)	$19^5/_8$ in.
Stroke	$24^3/_4$ in.
Cylinder-volume ratio (1 l.p. cyl., 2 l.p. cyls.)	1:6.5
Diameter of drivers	79 in.
Diameter of truck wheels	$39^7/_{16}$ in.
Rigid wheelbase	15 ft. 5 in.
Total wheelbase	30 ft.

High-Pressure Boiler

Steam pressure (exact)	853.5 lb. per sq. in.
Diameter of firebox tubes (internal and external)	$1^5/_8$ in., 2 in.
Heating surface of firebox (external)	217.8 sq. ft.
Diameter of evaporating coils in boiler (internal and external)	$1^1/_4$ in., $1^1/_2$ in.
Heating surface of coils (external)	426.3 sq. ft.
Length of boiler	16 ft. 11 in.
Diameter of boiler (internal)	3 ft.
Water content at lowest level	62.5 cu. ft.
Height of low-water level above center line	4 in.
Number of h.p. superheater units	30
H.p. superheater heating surface	430.6 sq. ft.

Low-Pressure Boiler

Steam pressure	205 lb. per sq. in.
Diameter of boiler	5 ft. 7 in.
Length of tubes	13 ft. 9 in.
Number of tubes	116
Diameter of tubes (internal and external)	3 in., $3^1/_4$ in.
Heating surface (internal)	1265 sq. ft.
Water content at lowest level	127.1 cu. ft.
Number of l.p. superheater units	56
Diameter of l.p. superheater tubes (internal and external)	$^{23}/_{32}$ in., $^3/_4$ in.
L.p. superheater surface	426.3 sq. ft.

Grate

Length	9 ft. 1 in.
Width	2 ft. $11^1/_4$ in.
Area	26.5 sq. ft.
Surface of feedwater heater	146.4 sq. ft.
Weight of locomotive empty	190,000 lb.
Weight of locomotive in service	204,000 lb.
Weight on drivers	133,900 lb.

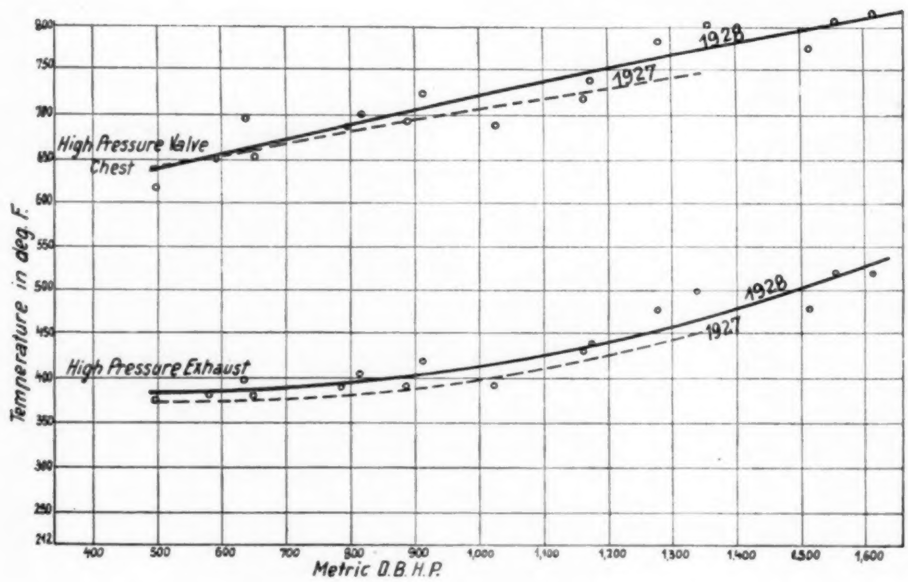


FIG. 6 MEAN STEAM TEMPERATURE AT 50 M.P.H.
(1 metric hp. = 0.9863 hp.)

Figs. 3 to 5, inclusive, show the general outline and appearance of the finished locomotive. From these it is seen that the space occupied by the high-pressure part of the boiler is practically identical with that of the firebox of any locomotive of the usual design. As the performance and qualitative value of the heating system when applied to intense radiation were not fully known at the time when this locomotive was planned, it seemed wise to subdivide the heating system. By doing so the quantity of steam and water set free by an explosion or leakage would be reduced to a fraction of the total water content. Consequently the heating system was subdivided into six parts which are clearly visible in Fig. 3. This meant also subdividing the collecting chambers and coils.

The bottom chambers are arranged all around the grate in place of a mud ring, the sections being clamped to each other so as to form a rigid frame structure. Each chamber consists of a steel block forged and bored hollow.

From these chambers the heating tubes extend upward, forming the four walls of the firebox; the front-wall tubes are bent forward so as to form a combustion chamber. The tubes are fastened in the chambers by rolling. Welding is not employed, as the joints are subject to bending stresses.

The two upper collecting chambers are 11 in. in diameter and at the bottom enter alternately the heating tubes of their own and of the opposite side; it is here where each individual system is filled with water at the beginning. A bull's-eye water gage indicates the water level when the boiler is cold.

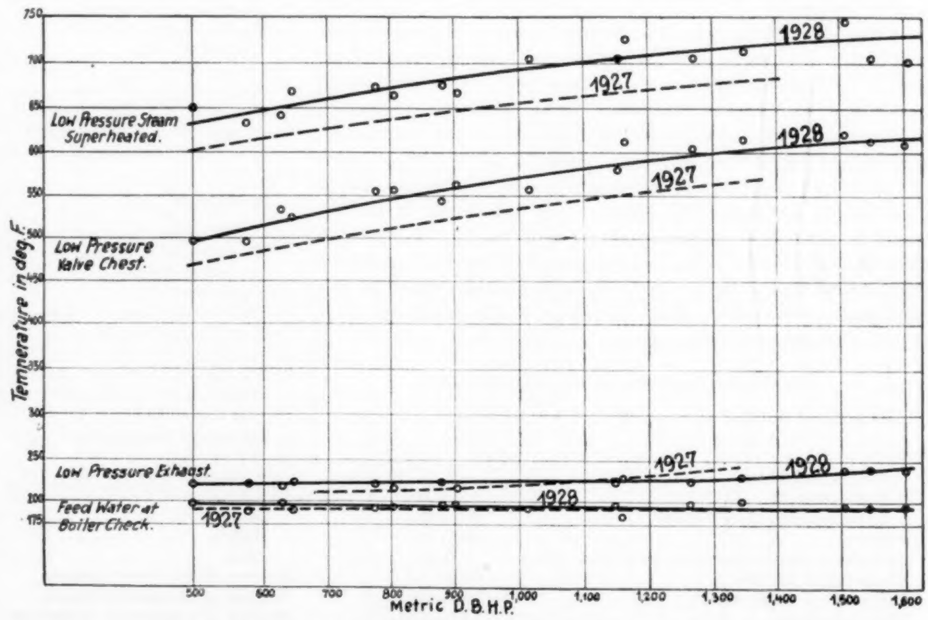


FIG. 7 MEAN STEAM AND FEEDWATER TEMPERATURES AT 50 M.P.H

The high-pressure boiler consists of a 3 per cent nickel-steel drum forged over a steel mandrel. By choosing this heat-resisting though soft material it was found possible to keep the thickness of the walls down to $1^{13}/_{16}$ in. A drum of this kind is first forged in the form of a thick-walled tube; it is then roughly machined inside and out, and if no fissures or segregations are found, both ends are shaped in another heat. After that it is machined to size. On the outside the heads of the drum are turned on the outside on a lathe, but the tubular part is machined lengthwise on a shaper because of its departure from a circular contour due to reinforcement at tube connections. All connections of the heating system are arranged on the outer side of the drum so that joint leakage will not empty one of the systems into the drum.

The front-end manhole is just large enough to permit machining the drum inside; the rear one is made as large as possible; and here the coils are inserted, and the boiler inspected and cleaned.

Determining the heating surface of the low-pressure boiler was another point of interest. Calculation pointed to a heating surface of around 1200 to 1300 sq. ft. (exposed to combustion gases), and one of 1265 sq. ft. was obtained by choosing for the boiler the type E superheater and putting into it 116 tubes of 3 in. inside diameter.

All of the feedwater enters the steam space of the low-pressure boiler close to the top of the forward steam dome, and is sprayed on loosely piled-up grates made from V-sections which form small troughs. In trickling down from layer to layer the water is quickly heated to a temperature above that at which scale is precipitated. The greater part of the scale is thus deposited upon

these racks, and the rest, washed down with the water, remains in suspension as an innocuous mud which slowly settles down on tubes and boiler plates but never forms a hard, adherent scale. This scale-precipitating device is part of the standard practice of the German State Railway Company, and in this case it is doubly useful as it insures fairly clean feedwater for the high-pressure boiler.

The high-pressure superheater occupies 60 tubes of the lower half of the boiler. The live steam enters a cast-steel chamber on the left-hand side of the smokebox. From this chamber 30 units or elements, each inserted into two tubes, lead horizontally across the front end to the collecting chamber placed on the right-hand side. The chamber admits the steam directly into the valve chamber of the high-pressure cylinder.

The low-pressure superheater, which is also of the type E, occupies the upper 56 tubes of the boiler. All units have a single return bend only, so 56 units in 14 groups are connected with both saturated and the superheated chambers of a regulation header arranged above the superheater. From this header each of two steam pipes lead, inside the front end, to a mixing chamber, in which high-pressure exhaust and low-pressure live steam are mixed (the former being thus resuperheated), and then on further to both outside cylinders.

The high-pressure piston is a pressed-steel block containing 6 narrow packing rings. The piston-rod packing, which during the design period it was feared would present a vexatious problem, consisted of six cast-iron rings instead of the usual three.

The crosshead, inside main rod, and crank axle remained unaltered, just as did practically every other part of the locomotive which has not been mentioned; even the angle of 120 deg., at which the three cranks were set was retained. This peculiarity gives to the locomotive a somewhat limping exhaust, as two of the six exhausts during one revolution are dropped out. This irregular sequence is noticeable up to a speed of 7 or 8 miles per hour, but it has not been perceived to have any effect whatever upon the draft at any speed.

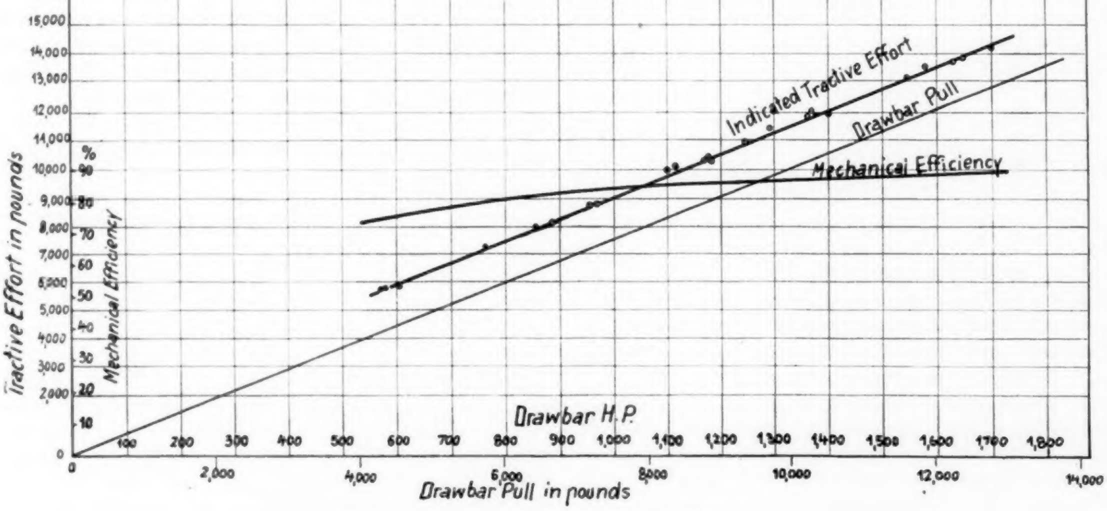


Fig. 8 Mechanical Efficiency at 50 M.p.h.

Results of Tests

After a number of preliminary runs the locomotive underwent a series of road tests carried out by means of one of the very complete dynamometer cars of the German State Railway. This first series was run in February and March, 1927, on the Magdeburg division, and covered a distance of 101 miles in most cases. Some of the results have been published in the Excerpt Minutes of Proceedings of the Meetings of the (British) Institution of Mechanical Engineers, London, Dec. 16, 1927, and were given in a discussion following the presentation by Mr. Lawford H. Fry of a paper dealing with the Baldwin locomotive No. 60,000.

After the tests were completed and had proved that the danger of an explosion of the heating systems was no worse than in any other type of boiler, the locomotive was returned to the makers and they were advised to connect all heating systems with one another so as to equalize the action of the coils, as it was found from the very first that each system developed a different pressure depending on its position with respect to the grate and the intensity of radiation to which it was subjected. This they did very excellently by replacing the subdivided lower and upper collecting chambers by one extending over the whole length of the firebox. The time in the shop was also utilized to extend both high-pressure and low-pressure superheater units closer to the firebox tube sheet, i.e., to 8 in. distance, as the superheat had been somewhat low.

A general inspection showed that the high-pressure boiler contained no solid scale at all. The only residue was a very thin layer of mud deposited upon the coils and the boiler shell. This mud is naturally entirely inactive and is washed off by the turbulent motion of the water. When dried it forms a thin film of dust which is blown off easily. This shows that the boiler-feeding process chosen by the Schmidt Company works to satisfaction, and that condensing operation need not be resorted to in a high-pressure locomotive provided the feedwater is purified first in a low-pressure boiler or feedwater heater.

After completing the alterations mentioned and some minor repairs, another series of dynamometer tests was run during the months February and March, 1928, most of them on the same division as before. In these road tests the department introduced its new system of loading a test engine which allows of maintaining draw bar pull and speed even on changing gradients. Instead of a train a specially arranged locomotive is coupled to the rear end of the dynamometer car. The distribution gear of this locomotive (which is held under steam) is reversed fully, the exhaust nozzle is shut off to prevent sucking in gases from the front end, and another port in the exhaust pipe is opened to let in fresh air from

outside. This air is compressed in the cylinders and blown off at variable pressure through a hand-controlled valve. To protect the cylinders from becoming heated beyond 850 deg. fahr. (a temperature reached very quickly by steadily compressing air) hot boiler water is squirted into the exhaust (or in this case, inlet) pipe. This water, which is ready for evaporation, rapidly absorbs the heat raised during the compressing process and holds the temperature down.

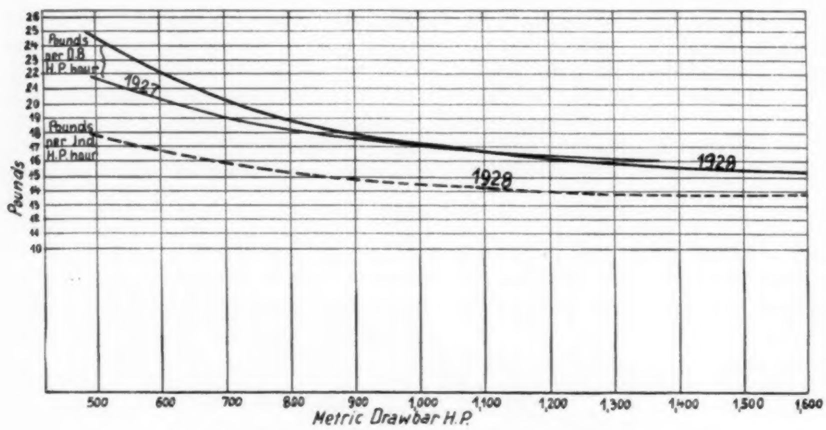


Fig. 9 Steam Consumption per Drawbar Hp-Hr.

The engineer of the brake locomotive adjusts his engine so as to maintain the test speed under all circumstances, whereas the locomotive under test maintains an even drawbar pull. Thus the weight of the imaginary train is adjusted in accordance with the varying grades. This method of testing gives results which permit of curves being made of an accuracy never before attained. In combination with a dynamometer car that allows the indicating as well as the reading of drawbar pull, speed, work performed, and all temperatures (by automatic resistance thermometers) and of a continuous analysis of the combustion gases, this method can justly be proclaimed to be as efficient as that of any stationary testing plant.

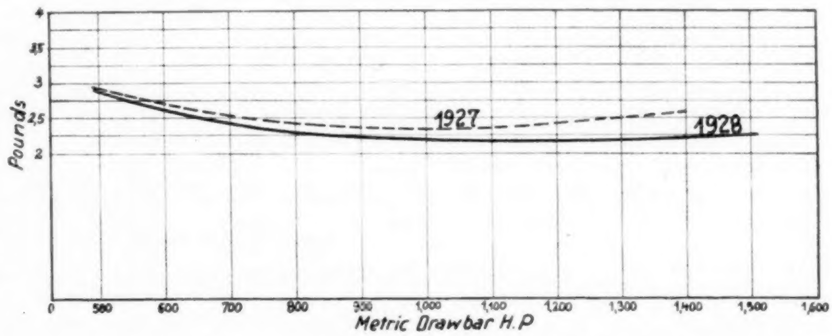


Fig. 10 Fuel Consumption per Drawbar Hp-Hr. at 50 M.p.h.

This method of testing, which had formerly been brought up to a standard of high reliability, was exclusively used in finding the curves shown in Figs. 6-10, and which are taken from the latest test report.

Fig. 6 shows the improvement in high-pressure superheat over the performance during the first series of tests, and further gives the absolute figures attained. It shows that at 1500 drawbar hp., 800 deg. fahr. is practically reached. This performance, considering the air resistance at 50 m.p.h., represents 2000 boiler hp., the full capacity of the locomotive. In 1927, owing to the imperfect heat transmission not more than 1350 drawbar hp. was attained, and, as the curve shows, at a somewhat lower superheat. Because of the higher superheat of the live steam the exhaust temperature is higher than before, and still considerably above saturation temperature. This serves to relieve somewhat the low-pressure superheater which supplies the extra heat for resuperheating the high-pressure exhaust.

Fig. 7 shows the corresponding figures for the low-pressure steam and the feedwater. The temperature of the low-pressure live steam has risen considerably and reaches 730 deg., a temperature which still could be improved upon, as the low-pressure exhaust line shows. The temperature of the low-pressure steam taken in the valve chest shows that between 100 and 150 deg. are consumed for resuperheating the expanded high-pressure steam. This figure is still open to improvement, as the low-pressure exhaust coincides for a considerable distance with saturation temperature, and probably includes minor condensation losses. The feedwater curve shows that probably the admission pipe for the exhaust steam is too small for full supply.

Fig. 8 deals exclusively with the recent test series and shows the indicated tractive effort based upon numerous cards taken simultaneously with all other readings, and the drawbar pull as registered automatically. From these two the mechanical efficiency of the locomotive, ranging from 75 to 90 per cent, is obtained. Comparisons with later types of locomotives, especially those equipped with a rigid bar frame, reveal the fact that the old-fashioned plate frame owing to its elastic deformation gives a somewhat higher motion resistance than a rigid-frame system. Ninety per cent was not exceeded with the former, whereas 93 to 95 per cent is by no means an unusual figure to obtain with the latter.

Fig. 9 gives figures on the steam consumption per horsepower-hour. The fact that these curves show a continuous decrease proves that the cylinder volume of the locomotive is large compared to the boiler capacity; the lowest rate per indicated hp-hr. is $13^1/_2$ lb., and per drawbar hp-hr., $15^1/_4$ lb.

Fig. 10 gives the actual fuel consumption per drawbar hp-hr. at 50 m.p.h. The curves show that although in 1927 $2^1/_4$ lb. per hp-hr. was not quite attained, the alterations made brought the consumption down to about $2^1/_8$ lb. The best feature, though, of the 1928 curve is that it is very flat, which means that this low consumption is maintained over a wide range of load.

All these curves were taken at the constant speed of 50 m.p.h., a good base for judging a passenger locomotive; readings at higher and lower speeds were taken as well, and these showed substantial agreement from 62 down to 43 m.p.h. Below 43 m.p.h., however, the steam and fuel consumptions rise in proportion to the longer cut-off and the smaller rate of expansion.

The Schmidt high-pressure locomotive will always hold the distinction of being the first locomotive designed for such an unusual pressure. It has already proved that great fuel savings are possible in ordinary service by employing a locomotive which is just as safe as any ordinary type, very little higher in first cost, and just as easily handled by a sensible locomotive engineer as any locomotive of recent design.

Mechanical Applications of Chromium Plating[1]

By W. Blum,[2] Washington, D. C.

After giving particulars regarding the physical properties of chromium such as hardness, thermal expansivity, density, melting point, electrical conductivity, and adherence, the author discusses the uses to which chromium plating, by reason of its wear-resisting qualities, has been more or less successfully put: namely, its application to gages and other measuring devices; to drawing, forming, stamping, and molding dies; to rolls for forming metals; to tools for cutting metal; to bearing surfaces in machinery, etc. He shows how in addition to savings due to the longer life of chromium-plated tools and parts, there are savings much greater in amount resulting from reducing the number of times that machines must be stopped for their replacement.

Two years ago, in summarizing the status of chromium plating at the Annual Meeting of the Society,[3] the author referred to it as the sensation of the plating field. The phenomenal developments in the last two years, especially in the automobile and plumbing industries, have now made chromium commonplace, and before long it will probably entirely supersede nickel as the finish on exposed metal parts of such products.

Simultaneously with the extensive use of chromium plating for the finish on exposed metal, its application for "wear resistance" has received careful consideration in many and varied industries.

In the following attempt to survey the present status of the mechanical uses of chromium plating, the author has acquired most of his information from visits to and correspondence with industrial firms. Experience shows that while laboratory tests are of value for defining the properties of a metal and for indicating its promising uses, the conditions in manufacturing plants often involve so many undefined or uncontrolled variables that the actual value of a metal for a given process must be determined empirically. Such conclusions as will be presented in this paper must be considered as tentative, and are published largely in order to stimulate more extensive quantitative studies upon the value of chromium for various purposes.

Most of the applications of chromium plating depend either upon its resistance to tarnish, or upon its hardness and wear resistance. Some uses, e.g., on plumbing fixtures, involve both of these properties. The present paper will be confined, however, to those articles on which chromium is applied principally in order to increase the resistance to wear or abrasion, and on which appearance is a subordinate or negligible consideration. Even for these uses, however, the protection against tarnish and corrosion that may be furnished by the chromium is an added, though secondary, advantage.

PHYSICAL PROPERTIES OF CHROMIUM

The value of chromium for any given mechanical application may depend not only upon its "hardness" (however that may be defined), but also upon other properties such as tensile strength, ductility, thermal expansivity, density, melting point, electrical conductivity, adherence, and interfacial relations in contact with liquids or solids. Unfortunately very few of these properties have been quantitatively measured, and even when data are available in the literature, it is not always certain whether they refer to electrolytic chromium or to that produced by other methods and possibly having different composition and properties. Pending the more exact determination of these properties, a qualitative or semi-quantitative discussion of them may be helpful.

Hardness. Of the various means used for measuring the hardness of netals, only the scratch hardness method is applicable to the very thin films of chromium, e.g., 0.0001 in. to 0.001 in. thick, that are usually employed on mechanical equipment. Methods such as the Brinell and its modifidations require much thicker deposits in order to eliminate the effect of the base metal. It is not safe to assume that the actual or relative hardnesses of very thick deposits will be the same as those of thin films.

In a recent study of the scratch hardness of electrodeposited chromium, L. E. and L. F. Grant[4] confirmed previous observations that the hardest chromium is harder than any other metal or alloy thus far tested. It is important to note, however, that they obtained relatively large differences in the hardness of deposits produced under different conditions.

At best the scratch hardness method is difficult and tedious to apply, especially when, as with chromium, the scratch is very narrow. At present, therefore, the method must be considered as a relative rather than an absolute or quantitative procedure.

Some measurements of the Brinell hardness of chromium by F. Adcock[5] show that the hardness may be very greatly affected by treatment subsequent to deposition. Electrolytic chromium with a hardness of about 600 had, after being heated in vacuo at 900 deg. cent., a value of only about 200. When, however, it was heated in hydrogen at 1500 deg. cent. the hardness was reduced to about 80. Adcock attributes the initial hardness partly to the presence of hydrogen or oxygen in the deposits. These observations have no direct bearing upon the wear resistance of chromium as deposited, but they emphasize the fallacy of heating to high temperatures (e.g., in order to produce "alloying") deposits which are to be subjected to wear.

Even more important than the measurement of hardness is the relation of the results to the wear resistance under any given conditions. Other conditions of service, however, such as on gages, dies, etc., may involve so many factors other than simple abrasion that it is unsafe at present to predict the service of a given metal from any simple hardness measurements.

Tensile Properties. So far as known, no data are recorded upon the tensile strength and ductility of electrolytic chromium; probably because of the great difficulty of preparing suitable test specimens. Qualitative tests show that it is extremely brittle, i.e., its ductility is almost zero. This fact largely accounts for the tendency of relatively thick chromium deposits to chip or flake when subjected to impact.

Thermal Expansivity. The adherence of chromium to the underlying surface when heated, either directly as in a glass mold, or indirectly as on a cutting tool or forming die depends partly upon its coefficient of expansion, or more strictly upon the relation between the coefficients of chromium and of the base

[1] Published by permission of the Director of the Bureau of Standards.

[2] Chemist, Bureau of Standards.

[3] See "Chromium Plating" by Wm. Blum, in Mechanical Engineering, vol. 49, no. 1, January, 1927, p. 33.

Contributed by the Machine Shop Practice Division for presentation at the Annual Meeting, New York, December 3 to 7, 1928, of The American Society of Mechanical Engineers. Abridged. The complete paper, with discussion, will be published in vol. 51, Trans. A.S.M.E.

[4] *Trans. Am. Electrochem. Soc.*, vol. 53 (1928), p. 509.

[5] *Jl. Iron & Steel Inst.*, vol. 115 (1927), no. 1, p. 369.

metal. The available data on the coefficient of electrolytic chromium are probably not of high accuracy on account of the difficulty of preparing long, coherent specimens. The linear expansion coefficient given in I.C.T. (International Critical Tables) for the range from 0 to 500 deg. cent. (32 to 932 deg. fahr.) is 8.1×10^{-6}. This value is very similar to those for glass and platinum, and much less than those for iron, copper, nickel, zinc, and most of the common alloys. This fact undoubtedly accounts for part of the difficulty experienced with flaking of chromium from articles subjected to high temperatures in service. It also suggests the possibility that for special uses, alloys with an expansion coefficient closer to that of chromium might be employed.

Density. The density of electrolytic chromium is chiefly of interest because it serves as a basis for the calculation of the average thickness of deposits from their weight and area. So far as known, the density of electrolytic chromium has never been accurately determined. The value of 7.1 for cast chromium given in I.C.T. may be employed pending measurements on electrodeposited chromium.

Melting Point. The high melting point (1615 deg. cent. or 2940 deg. fahr.) of chromium makes it very unlikely that the plated coating will actually fuse under any conditions to which it is subjected in mechanical equipment, as this melting point is appreciably higher than that of any common metal that may underlie the chromium.

Electrical Conductivity. The accepted value (in I.C.T.) for the resistivity of chromium is 2.6×10^{-6} ohm-cm., a value almost identical with that for aluminum, and less than that of other metals except silver, copper, and gold. It does not follow, however, that the resistance of a contact between chromium and another metal will be low.

Adherence. The occasional failure of electroplated chromium to adhere to the base metal under severe conditions of service is one of its serious limitations.

In general it is not so difficult to obtain satisfactory adherence of the chromium to a plain carbon steel, even when case-hardened, as it is to certain of the alloy steels that are used for tools and dies. A few observations indicate that it is more difficult and requires a higher current density to produce satisfactory deposits on steels containing chromium and tungsten than on other steels.

In preparing the surface it is of course necessary to insure perfect cleaning, and especially the removal of any oxide coating. In addition, it has sometimes been found advantageous to employ a reverse current, i.e., to make the article the anode for a minute or less before making it the cathode and depositing upon it.

Interfacial Relations. It has been frequently observed that many liquids, including water and even molten metals, do not readily wet a chromium surface. This behavior, which may be due to surface films, materially increases the tarnish resistance and protective value of the chromium coating. Similar observations have been made regarding the contact of chromium with metals or other solids. Thus it is claimed by many that chromium-plated files do not hold particles of metals or other materials as tenaciously as do the unplated surfaces.

The value of chromium upon bearing surfaces may depend not only upon its coefficient of friction under given conditions, but also upon its ability to resist abrasion and chemical action, and thus to maintain for a longer period the initial condition of the surface. A few preliminary observations by W. H. Herschel at this Bureau indicate that with a given oil a slightly dull surface of chromium has a lower coefficient of friction than a polished surface. The possible significance of this difference (which is observed also with other metals) is that the chromium, because of its hardness, will preserve this dull surface better than other metals. Another possible advantage of chromium upon a bearing surface is that it may then be possible to lubricate with an oil such as lard oil, which produces a low coefficient of friction, but which cannot be used on those bearing metals which are attacked by any free acid liberated from the lard oil.

TYPICAL APPLICATIONS

The uses for which chromium plating has been tried or suggested are so numerous, and many are apparently so unrelated, that it is difficult to devise any logical or helpful classification of them. For convenience they will be divided into devices employed for the fabrication of articles from metals or other materials, which include those used for (1) measuring, (2) forming, and (3) cutting, and applications to improve the operation of finished machinery or equipment.

Measuring Devices

Chromium plating has proved especially valuable on measuring devices, because its resistance to abrasion decreases the tendency for any change in dimension, or for any obliteration of graduation marks. The latter factor justifies its use on linear scales, verniers, micrometers, tapes, etc. During the past few years it has been applied successfully upon the 50-meter base-line tapes used by the U. S. Coast and Geodetic Survey. For this purpose the chromium is plated for only a short distance on each side of the principal graduations. Experience has shown that on the chromium-plated tapes the graduation marks retain their definition much better than on the plain tapes.

Chromium has been more extensively and more successfully applied upon plug gages than on any other measuring devices. Of the numerous replies received on this subject, all were favorable except one, and the life of the plated gages in service was estimated to be from three to ten times that of the unplated gages.

Although it is possible with proper control of the plating process to deposit upon a gage exactly the requisite thickness of chromium, and to use the gage without subsequent lapping, experience has led in almost every case to the deposition of a somewhat thicker coating, the excess of which is then ground or lapped off. The data received include thicknesses from 0.0002 in. to 0.004 in. The thickest coatings were applied for bringing greatly undersized gages to dimension. In general the chromium coating should be thick enough so that it will not be penetrated when the gage is worn down to its lower wear limit. It is then a simple matter to strip off the chromium (e.g., by a reverse current in a sodium hydroxide solution) and to replate to the desired dimension. While of course the minimum thickness required will depend upon the dimensions of the gage before plating, there is no evident advantage in applying more than 0.001 in. of chromium, and for many purposes half that thickness is adequate. If the gage is made to be about 0.0008 in. undersize (in diameter) a deposit with an average thickness of 0.0006 in., corresponding to an increase in diameter of 0.0012 in., will usually be sufficient to leave a thickness of 0.0004 in. after lapping to the right size. If then the wear limit of the diameter is 0.0003 in., the gage will still have a coating of chromium about 0.00025 in. thick when it is returned for replating.

Although chromium-plated thread gages are now used in several plants, there is still much uncertainty and skepticism regarding their reliability. This doubt arises from the difficulty of depositing chromium uniformly upon the surface of the threads. In any plating process the deposit is always thinner in a depression than upon a projection, and this difference is accentuated by the notoriously poor "throwing power" of the chromium-plating bath. As a result of the uneven distribution of chromium upon the threads, not only the diameter of the gage, but also the thread angle, is altered.

The few experiments made with thread gages show that when any appreciable thickness of chromium is applied the changes in

pitch diameter and major diameter and in the included angle, are likely to be greater than the normal tolerances for such dimensions. It will therefore usually be necessary to regrind the gages after plating, unless they have been previously so ground as to allow for the uneven distribution of the chromium. The latter procedure is probably feasible if a large number of similar gages are being made and plated.

The data obtained regarding ring and snap gages indicate that chromium plating increases their life to about the same extent as it does on plug gages. It may safely be stated, therefore, that chromium plating will prove valuable upon any measuring device which is subject to abrasive wear in service, provided the shape is such that the chromium can be applied with reasonable uniformity.

Forming of Metals

Drawing Dies. The information received shows an apparent contradiction in that dies and mandrels used for tube drawing were generally reported as satisfactory (with one exception), while wire-drawing dies were usually unsatisfactory. The latter were reported as failing through flaking or peeling of the chromium, and subsequent scratching of the wires. The only obvious explanation of this discrepancy is that the apertures in the wire dies are usually much smaller, and therefore more difficult to plate uniformly than those in the tube dies.

In connection with the manufacture of hot-rolled seamless steel tubes, the successful use of chromium-plated drift balls was reported.

Forming Dies. Very favorable reports were received regarding the value of chromium plating upon dies used for forming sheet steel and brass. In some cases the life of the dies is increased up to eight times the normal service. One special advantage observed with the chromium-plated surface is that the metal does not stick to it as much as to steel. It is significant that the thickness of the chromium coating on these dies is usually less than 0.0005 in.

Stamping Dies. In those cases where the metal is formed or a design produced upon it by a sudden impact instead of by a steadily applied pressure, the chromium coating is of doubtful value. This is because under such severe conditions the chromium tends to flake or chip, probably because the underlying metal, even when it is case-hardened, is at least temporarily deformed. In such cases success is more probable with thin than with thick coatings. A few experiments, not yet completed, upon coinage dies at the U. S. Mint in Philadelphia, illustrate this difference. Those dies with a coating of 0.0005 in. or more of chromium all failed in a comparatively short time. Those with only 0.0002 in. of chromium lasted slightly longer than the steel dies, and yielded consistently sharper impressions. While the advantages gained with the chromium-plated dies have not yet warranted their general application at the Mint, they are still under consideration.

In connection with these experiments it was found that the hardened steel collars which hold the coin blanks and fix the diameter of the coins, could have their life greatly increased by chromium plating. Thus for the five-cent coins, composed of a nickel-copper alloy, the average service of the chromium-plated collars is about 600,000 pieces, i.e., three times that of the unplated collars. As moreover the chromium can be stripped at intervals and the collars replated, their life is made almost indefinite and, what is more important, the resultant coins are of more nearly uniform size.

One plant reported favorable results with dies used in hot forging. If this experience is confirmed, the improvement may be due at least as much to the protection furnished by the chromium against oxidation as against abrasion. This application is somewhat similar to the use of chromium on glass molds that has been reported both in Germany and in America.

Both spinning and burnishing tools may be classified as forming devices, even though the action of the latter is confined to the surface. Several favorable reports were received upon both of these applications of chromium, though one person found difficulty with flaking of chromium from the burnishing tools. It is not clear whether this discrepancy was due to the quality of the plating or to the character of the metal burnished. A few observations at the Bureau upon spinning tools showed very favorable results for the chromium.

Molding Dies. One of the most successful applications of chromium is upon dies used for molding plastic materials such as rubber, bakelite, ceramic clays, etc. The increased service observed is due not only to the resistance of the chromium to abrasion by particles in the molding compound, but also to corrosion by sulphur, phenol, water, or other substances present in the materials. Large chromium-plated metal sheets are being used successfully in the presses employed to produce insulating materials such as those composed of fiber and a phenol condensation product.

Rolls for Forming Metals. The great size and weight of the rolls used in many operations renders their plating somewhat difficult. Rolls used for finishing sheet metal would almost certainly have their life increased by plating.

Upon rolls used for crushing hard materials such as rocks, the chromium may be less promising, as the conditions of service are very severe, and are likely to lead to fracture and flaking of the chromium. In some cases chromium-plated rolls used for crushing softer materials such as cereals, have proved very much superior to hardened steel.

Cutting of Metals

The data received regarding chromium on tools used for cutting metals are more variable and less favorable than those for any other uses. The general difficulty may be summed up by saying that if the chromium is thick enough at or near the cutting edge to exhibit its great hardness, it is likely to fracture, and if too thin, it soon wears off the edge and offers little advantage. The value of chromium is no doubt affected by such factors as the angle and type of the cutting edge, the speed of cutting, and the material being cut. In at least a few cases favorable results have been obtained by plating only one side of the tool with a fairly thick chromium deposit. The tool can then be ground repeatedly upon the steel side, thus always leaving a cutting edge of chromium.

Blanking dies furnish a good illustration of the difficulties with chromium plating, especially when they are used on hard metals such as steel. The impact is such that any fairly thick deposit is likely to flake, and thin deposits usually add but little to the service. On the other hand, such tools as milling cutters, reamers, drills, and taps have frequently shown a material increase in service after plating. The most consistent gains are obtained when cutting such substances as slate, asbestos board, and bakelite, which materials, though commonly referred to as "soft," cause rapid wear of steel tools.

The experience with saws of various types is like that with other cutting tools. If a thick coating is applied there is a marked tendency for the formation of nodules or "trees" upon the points of the teeth. These dull the points, and if, as usually occurs, they break off in service they leave the teeth rough and irregular. For such articles it is therefore preferable to use relatively thin coatings. This conclusion is confirmed by the results reported for hack saws. Even with the thinner coatings they were not so satisfactory for cutting steel as for such materials as slate and asbestos.

In this connection a few experiments are in progress at the Bureau by J. R. Freeman, Jr., upon cutting steel rails with a power saw and high-speed (tungsten) steel saw blades. Some difficulty was encountered in getting a uniform coating of chromium on this alloy, and a very high current density was required. Owing to the tendency to pile up chromium on the teeth, the thickness there was indeterminate, but certainly much greater than the average thickness computed from the current density and time of plating. With an average thickness of about 0.0004 in. there were very pronounced nodules on the teeth, and it required considerably longer to cut through a rail than when using the unplated blade. Even with much thinner coatings, e.g., those having an average thickness of about 0.00005 in., the initial speed of cutting was slightly decreased, showing that there was some dulling of the edges. Some time will probably elapse before conclusive data upon the useful life of the plated saws will be obtained.

The results reported for files were somewhat similar to those for saws, in that any appreciable thickness of chromium tends to dull the files. It was reported by several persons that chromium-plated files show much less tendency to clog in use than unplated files. Whenever a material tends to fill the files, the use of light chromium coatings may be justified even though the useful life of the file may not be greatly increased. In some cases, however, an increase to double the original service was obtained.

A few reports upon woodworking tools, including saws, chisels, and lathe tools, show that their life is very greatly increased by the use of chromium coatings. Results with rock drills are still uncertain. Experiments are also being made by one firm upon chromium-plated plowshares. For this purpose the resistance to corrosion may be helpful, even if the actual cutting edge is not greatly improved.

Operating Machinery

In spite of the apparently obvious applicability of chromium upon all parts of machinery that are subject to wear in service, such use is still far from being a general or even a preferred practice. The failure to adopt chromium for such purposes may be due to various causes, including the size or inaccessibility of many of the parts, and the fear that if the chromium should become detached from a bearing surface, the particles would serve as an abrasive and cause permanent injury to the mechanism. While the latter possibility warrants careful consideration and proper caution, the probability of its occurrence is not evident from the meager data available. If, as was suggested earlier in this paper, a lower coefficient of friction can be obtained and maintained on a chromium surface than on other metals, the use of chromium on bearing surfaces may prove beneficial. There is no justification, however, for assuming that the use of chromium will obviate the necessity for lubrication.

Although the automobile engine is a mechanism upon which the application of chromium would appear promising, very few such uses have ever been made on a production scale. Chromium-plated piston pins, employed on one make of car, owed their selection as much to protection against corrosion by sulphur compounds as to resistance to abrasion. Efforts to plate pistons with chromium have not been entirely successful, though considerable attention is now being given to this possibility on aircraft engines. It has been recently reported that on one of the cars in the Indianapolis races chromium-plated steel journals were successfully used in aluminum-alloy bushings. If this experience is confirmed it indicates that the successful use of chromium on bearings may depend upon and permit the use of bearing metals different from those commonly used.

In a few cases chromium-plated gears have proved satisfactory. Such uses are, however, most promising upon light equipment such as speedometers, counting machines, etc. For such purposes they have reduced the noise of operation and also increased the useful life.

One strikingly successful application of chromium plating has been on 9-in. piston rods of Diesel marine engines. These rods run in a cast-iron packing with only moderate lubrication. It was found that the application of 0.003 in. of chromium to the surface of the rods resulted in smoother operation and less difficulty in lubrication. The unplated rods lost about 0.001 in. in diameter for every 5000 miles of service, while the chromium-plated rods required 45,000 miles of operation to produce this same loss in diameter. Incidentally these piston rods, which were water-cooled, were also plated on the inside with chromium, which greatly reduced the corrosion.

Although printing plates are not ordinarily considered as a part of a machine, they virtually become a part of a printing press when in use. The experience with printing plates may therefore be suggestive. Currency plates consisting of electrolytic nickel coated with chromium yield about twice the number of impressions obtainable from case-hardened steel plates. Curved stamp plates, made of case-hardened steel and chromium plated, yield about double service, and can be stripped and replated several times before being worn out. Nickel electrotypes when chromium plated produce from three to five times the normal number of impressions, and are therefore extensively used for long editions, e.g., those of wrappers, labels, and cartons. It should be noted, however, that in all these applications the chromium is valuable for its resistance to abrasion, and does not materially add to resistance to deformation or fracture if for any reason the plate is subjected to an excessive strain or sudden shock.

CONCLUSIONS

Chromium plating owes its application upon mechanical equipment primarily to its great hardness, as exhibited in its resistance to abrasion. The chief limitation in the use of chromium for such purposes is its extreme brittleness, which may cause it to crack and flake when deformed. The most successful mechanical uses of chromium are upon measuring instruments such as gages of all types, the service of which is often multiplied several fold. Upon forming and molding dies it is generally satisfactory and beneficial, especially if the conditions do not involve too severe impacts. Upon cutting tools it is of doubtful value, though in numerous applications it has proved successful. Upon moving parts of machinery there have been but few successful applications, but these indicate that with further study many such uses may be developed.

It is impossible to estimate even roughly the savings that have been or may be accomplished through the use of chromium on mechanical equipment. The cost of the tools or devices that may be dispensed with because of the greater life of those that are chromium plated, represents only a small part of the economic gain. The money saved in reducing the number of times that a machine must be stopped for replacement of a tool or die may amount to many times the cost of the device. Perhaps the greatest gain is the somewhat intangible but far-reaching benefit arising from the manufacture of more uniformly dimensioned parts, whereby the useful life of a machine such as an automobile may be materially lengthened.

Chromium plating is not a panacea for wear. An everlasting tool or machine is as visionary as perpetual motion. Chromium plating has, however, solved many machine-shop problems, reduced costs of operation, and improved the quality of the products. When we recall that almost all this progress has been made in less than three years, there is good reason to hope and to believe that with the large number of investigators now at work on this subject, even greater results may be expected.

Graphical Methods for Least-Square Problems

By EVERETT O. WATERS,[1] NEW HAVEN, CONN.

Graphs of experimental data are generally drawn by cut-and-try methods. Since it is impossible, in practically all cases, to make a straight line or a smooth curve pass through the plotted points, the test engineer sketches in a line that comes fairly close to the points, and "looks right;" or else he segregates the points into three or four groups, finds the average position of each group, and draws a curve through these average points.

The "best" curve in any case can be computed by the method of least squares, but the process is laborious, and introduces errors commensurate with those of the original observations unless the calculations are worked out longhand or with a computing machine. Apparently, therefore, a quick, accurate method for performing these computations graphically, should be of interest to all who have the task of working up experimental data.

The present paper describes such a method. To obtain a straight-line graph, three simple, direct steps are necessary. By means of certain additional constructions, or by using logarithmic cross-section paper, the method may be extended to curves of almost any desired form. In the case of data having cyclic variations, such as kilowatt output of central stations, meteorologic observations, etc., the "best" periodic curve may be derived graphically by a slightly different method. In any event, guesswork is replaced by reliance upon the established propositions of the theory of probability.

IT IS a well-known fact that engineering test data are commonly presented in the form of curves. Simultaneous observations are made of two varying quantities, such as temperature and time, speed and horsepower, or payroll and production; these observations are plotted as points on a plane chart which affords an x-value and a y-value for each point; and a curve is then drawn through or near the points with the tacit assumption that there is some sort of relation between these x- and y-values. If the points are exactly traversed by the curve, this relation is evidently a simple mathematical equation in x and y. If, as is much more often the case, the curve is merely adjacent to the points, it is still assumed that the mathematical relation exists, but that the discrepancy is due to unavoidable errors of observation or to unexplained factors which the chart is supposed to suppress rather than emphasize.

Naturally, therefore, the curve should be drawn so as to reduce these errors to a minimum. It may be located by placing a transparent straight edge or curved rule on the plot and moving it about until the errors *appear* to be as small as possible, the eye of the draftsman being the sole guide to the fit of the curve, or the points may be separated into groups, the mean of each group located, and a line drawn through these mean points. In this case an exact calculation has been substituted for visual guesswork. But the question may fairly be asked: Is this line the "best" one that can be drawn? Obviously, the answer is ambiguous, since different groupings give different averages, and the resulting curves would be far from identical.

In any case the best curve will be that one which reduces the standard error to a minimum, the standard error being defined as the root-mean-square of the errors of all the plotted points.[2] If the x-observations are perfect and the y-observations are inexact, these errors will be the differences between the y-values of the plotted points and the y-values of the curve for corresponding x-values. If both x- and y-observations are inexact and to an equal degree, the errors are the distances from the plotted points to the curve. No proof of these statements is given here, as ample substantiation may be found in most treatises on statistics or the theory of probability. An obvious corollary is this: by making the number of coefficients in the equation relating x and y equal to the number of plotted points, the standard error may be reduced to zero. But the snakelike curve resulting would defeat its own purpose by obscuring the relationship that the chart is intended to prove. Generally speaking, the nearer the plotted curve approaches a straight line—i.e., the flatter it is—the more suitable is the diagram for giving a mental picture of the results. Very often a straight line is the most satisfactory one that can be drawn.

Unfortunately, the least-square method has, in the minds of most engineers, one great drawback: the involved computations required. The slide rule cannot be used efficiently, because of the mixture of multiplication and addition; furthermore it is not accurate enough, because the solution of the normal equations usually brings in small differences of large products, and the observational errors of the slide rule may easily overshadow those of the original data. A simple and accurate device for applying the least-square method without calculation should therefore meet with ready acceptance. Such a method will be outlined in the following paragraphs. The process is essentially a graphical one, using the planimeter to perform additions and multiplications simultaneously. A polar planimeter with adjustable arm, such as is used for averaging indicator cards, is most convenient, but a plain planimeter will do about as well.

The following type cases will be discussed, as being those most frequently encountered in engineering practice. However, they are merely representative, and many others could be added before the list would be complete.

- Case 1 Straight line, x-observations perfect, y-observations subject to error
- Case 2 Straight line, x- and y-observations subject to error
- Case 3 Conditioned hyperbola
- Case 4 Parabolic curve, symmetrical about y-axis or origin; exponent has any value
- Case 5 Exponential or logarithmic curve
- Case 6 General parabolic curve
- Case 7 Sine-cosine curve.

Case 1—Straight Line, Ordinate Observations Subject to Error

The construction consists essentially of three steps, which are fundamental not only to this case but to all the others except Case 7. For this reason they are enunciated at the start, and their importance cannot be overemphasized. They are:

1 Transfer of the x- and y-axes to an origin located at the average of the x- and y-values of the plotted points.

2 Summation of x'^2 and $x'y'$ with the planimeter, x' and y' being the coordinates of the plotted points, referred to the new axes.

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[2] "Statistical Methods," by F. C. Mills, p. 368.

3 Drawing of the empirical line through the new origin and the point whose coordinates are $\Sigma x'^2$ and $\Sigma x'y'$.

The detailed process of locating the new origin is best performed with the adjustable-arm planimeter, unless there are only a few points, in which case the draftsman may prefer to do his averaging by arithmetic. Mark off equal spaces—inches, half-inches, or some other convenient unit—on the x-axis of the chart, equal in number to the plotted points. In Fig. 1, a, b, c, to h are the plotted points, and j, k, l, to r mark the equal spaces. Set the adjustable points of the planimeter to the total distance

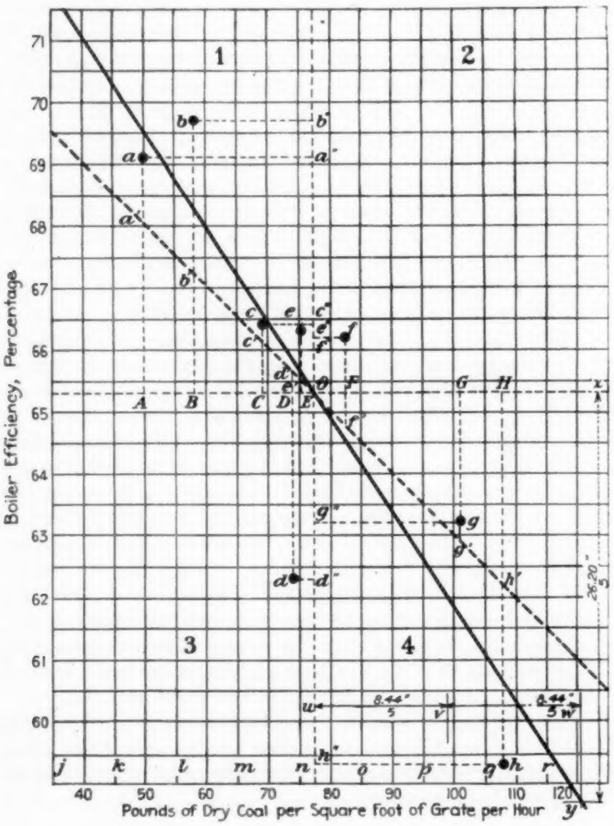

FIG. 1

jr; start the planimeter at j, go straight up to the abscissa of a, across one space, up to the abscissa of b, across one space, up (or down) to the abscissa of the next plotted point, and so on until the tracing point is directly above r. Then trace down to r and across to j. The reading of the planimeter will now be the average height of the figure traced, which obviously coincides with the average height of the observed y-values. The average of the x-values may be measured in the same way, using the y-axis as a base line.

If an averaging planimeter is not available, one of the fixed-arm type may be used. It is a well-known proposition in the theory of this instrument that the area traced equals the length of the tracing arm multiplied by the true rolling distance of the drum. Hence, if a figure is planimetered whose length equals the arm length times one-tenth the circumference of the contact flange of the drum,[3] the reading of the drum will coincide with the average height of the figure. Accordingly, if a fixed-arm instrument is to be used, the distance jr (Fig. 1) should be made equal to $\pi cda/10$, where c = a simple constant like 5 or 10, d = diameter in inches of contact flange of drum, and a = arm length in inches from pivot to tracing point. This distance, which is a constant for any planimeter, can then be subdivided into the requisite number of equal parts and the averaging process performed exactly as described in the preceding paragraph, except that the planimeter reading must be divided by c.

The point determined by these two averages is O, Fig. 1. Next, the planimeter is again brought into play, and the total area of the 45-deg. triangles OAa', OBb', OCc', etc., is obtained in the usual manner. It is not necessary to note down the area of each individual triangle or to pay any attention to the scale of the diagram; simply start at O and trace the lines OA, Aa', $a'O$; OB, Bb', $b'O$; etc., in turn, remembering always to go around in a clockwise direction, until all the triangles have been accounted for. The final result is then read off the dial or drum of the planimeter, and a numerically equal distance is laid off *twice* to the right (or left) of the vertical line through O. In Fig. 1, for instance, the triangles added up to 8.44 sq. in. on the

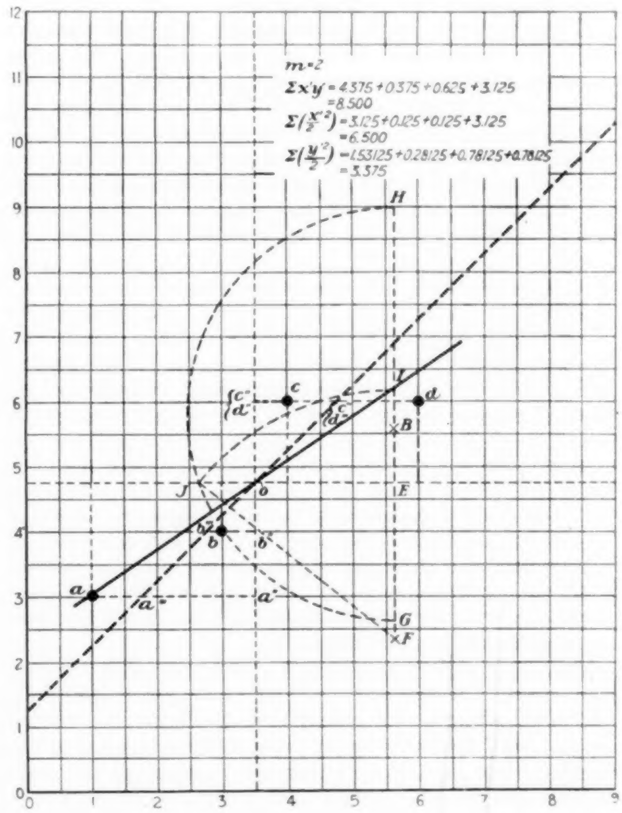

FIG. 2

author's original layout; so 8.44/5 in. were laid off from u to v and again from v to w. Here, again, it should be explained that the particular scale that is used makes no difference, but for the sake of accuracy it is well to make it as large as possible, and the nearer w is to the edge of the chart, the better will be the final result. In this manner the x'^2-summation is obtained.

The $x'y'$-summation is very similar, the only difference being that instead of taking the areas of a number of triangles the rectangles $OAaa''$, $OBbb''$, $OCcc''$, etc., are measured and the total area obtained. In the original of Fig. 1 this was 26.20 sq. in.; accordingly, 26.20 units of the same size as in the preceding paragraph (fifth-inches) were laid off downward from a random point x on the horizontal through O, giving point y at the intersection with the previously drawn line through w. A straight

[3] Assuming that the customary graduation is engraved on the drum: ten major divisions, each of which registers 1 sq. in.

line through y and O is then the "best" straight line that can be drawn to indicate the relation between boiler efficiency and rate of firing, for the particular set of tests recorded.

It will be noticed that the horizontal and vertical lines that were drawn through the central point O divide the diagram into four sections or quadrants that may be numbered 1, 2, 3, 4, as indicated. In this example, all the points a, b, c, etc. lie in the diagonally opposite quadrants 1 and 4, with the exception of d and f, which are in quadrants 3 and 2. The rectangles which these two points locate should therefore be traced *counterclockwise* by the planimeter, in distinction from the clockwise direction used for the points in the quadrants which contain the 45-deg. line. In all cases the triangles are traced in a clockwise direction.

The equation for the empirical line is $Y = aX + b$, where a is the ratio of $x'y'$ to x'^2, as found by the planimeter, and b is the intercept of the line on the original y axis.

CASE 2—STRAIGHT LINE, ALL OBSERVATIONS SUBJECT TO ERROR

If the x- and y-observations are both in error, a good approximate rule to follow is this: Draw an empirical line, by the method of Case 1, on the assumption that the y-values only are in error; draw another line by the same method, assuming that the x-values alone are in error; then draw the final line between these two, inclining it toward one or the other according as the x- or y-values have greater weight. In case the deviations appear to be fairly large, as in Fig. 2, it may be better to use the accurate, though somewhat longer, process. First, locate the mean point O and transfer the axes as before. Lay off OE on the new x-axis equal to $\Sigma x'y'$, using any convenient unit of measurment; from E lay off EB vertically upward, making it equal to $\Sigma(y'^2/2)$, obtained by tracing the triangles $Oa''a'''$, $Ob''b'''$, etc.; and from B lay off BF vertically downward, making it equal to $m\Sigma(x'^2/2)$, m being the weight of the x-observations relative to the y-observations. The latter summation is obtained exactly as in Case 1. Prolong the line through F, E, and B and points G and H on it, such that $EG = OE$ and $EH = OE \times m$. Make GH the diameter of a semicircle cutting the new x-axis in J, and swing radius FJ on to line FH. The point I thus located, together with point O, determine the empirical line.

The equation of the line is of course $Y = aX + b$. Exact formulas for a and b are given in an appendix to the complete paper.

CASE 3—CONDITIONED HYPERBOLA

Frequently the x-observations increase while the y-observations decrease, suggesting a reciprocal relation and a curve of hyperbolic form. The general hyperbola does not lend itself readily to graphical treatment owing to the large number of constants to be evaluated; but by "conditioning," it is very easy to locate and plot an equilateral hyperbola, having one of the axes as asymptote, and satisfying the least-square criterion. For example, in the direct-current series-motor test plotted in Fig. 3 it may be assumed with reasonable truth that the starting torque is of a much greater order of magnitude than any of the values obtained under running conditions. That being the case, the curve is obtained as follows:

First, draw the ordinates through the plotted points a, b, c, to h, and with the upper left-hand corner of the diagram as a center, draw a quarter-circle large enough so that the tangent to it at the point where the a-ordinate cuts it will extend approximately to the upper right-hand corner of the chart. From the point where this tangent cuts the top line of the diagram, drop an ordinate to a' on the same horizontal with a. In the same manner draw tangents to the quarter-circle where it is intersected by the b-ordinate, c-ordinate, etc., and locate points b', c', etc.

For those ordinates that do not cut the quarter-circle the reverse construction is used; i.e., for the e-ordinate draw mn through its upper end and tangent to the quarter-circle, and then draw an ordinate through the point of tangency m, locating e' on this ordinate on the same horizontal with e. The entire construction of ordinates and tangents can be performed very rapidly with a sharp-cornered draftsman's triangle, as suggested by the dot-dash outline in Fig. 3.

If the hyperbola is a suitable curve for the problem in question, it will be found that the auxiliary points a', b', c', etc. are approximately in line, and this fact may be used as a test for the appropriateness of such a curve.

The next step consists in fitting a straight line rs to the auxiliary points. This is done in precisely the same manner as outlined for straight-line diagrams and therefore need not be elaborated here. Having located rs, it only remains to set dividers to the respective vertical deviations—i.e., the vertical distances between the auxiliary points and the intersections of their ordinates with rs—and transfer them to the original a, b, c, etc., ordinates. This gives a series of points on the desired curve, which may then be sketched in and completed with a curved rule. This

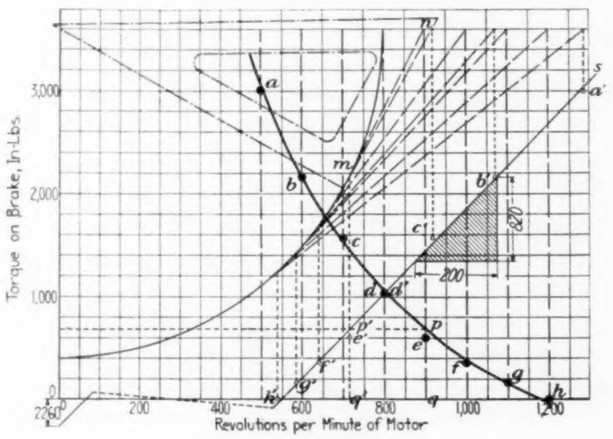

FIG. 3

curve, shown by a heavy line in Fig. 3, is the "best" hyperbola with two arbitrary constants that can be fitted to the given data. Its equation is $Y = (a/X) + b$, where a is the slope of the auxiliary line rs multiplied by the square of the radius of the quarter-circle (measured in the same units as X) and b is the y-intercept of the auxiliary line; i.e., in Fig. 3, $a = (820/200) \times 800^2$, and $b = -2260$.

CASE 4—PARABOLIC CURVE

The general parabolic or hyperbolic form of curve, with axis of symmetry passing through the origin, is one that frequently lends itself well to the representation of test data. The equation of such a curve is $Y = aX^b$, a and b being either positive or negative, integral or fractional. If we try to fit a curve that will make the root-mean-square of the y-deviations a minimum, the normal equations are very unwieldy, and a graphical method is apparently out of the question. But by making the well-known transformation to logarithmic coordinates, the equation becomes $\log Y = \log a + b \log X$, and it is a simple enough matter to find a line such that the root-mean-square of the deviations of $\log y$ will be a minimum. This is a mathematical subterfuge that may seem unjustifiable according to the strictest canons of logic, but it is recommended by statisticians[4] and is certainly acceptable on the ground of simplicity.

The use of logarithmic coordinates is so common in engineering

[4] "Statistical Methods," pp. 290–297.

practice that it is hardly necessary to work out a sample problem to illustrate the graphical method. Briefly, the process consists in transferring the observations to full-logarithmic paper, using any convenient combination of scales, fitting a straight line to the points by the method of Case 1 or Case 2, and then, if desired, retransferring to regular coordinates by picking off a sufficient number of points from the straight line to insure a smooth curve on the regular-coordinate paper.

Case 5—Exponential or Logarithmic Curve

A type form very similar to the preceding is the exponential or

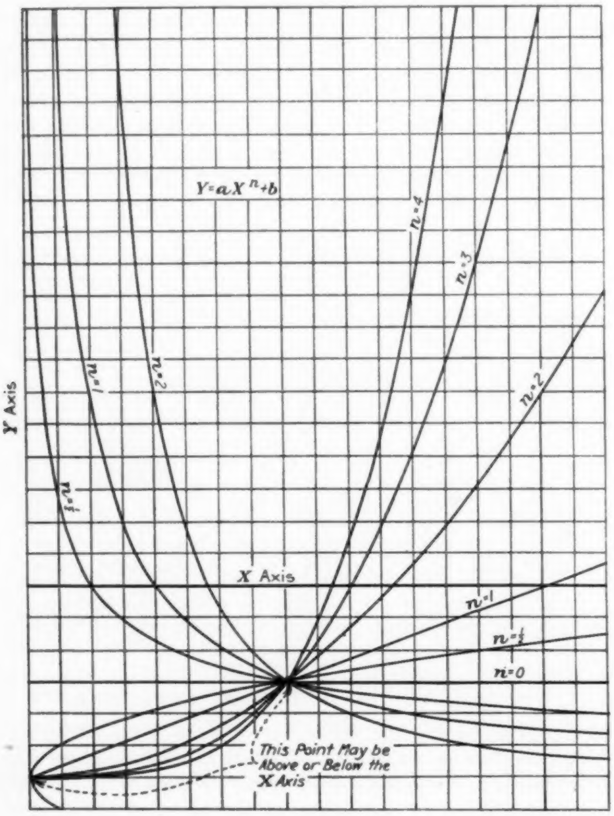

Fig. 4

logarithmic curve $Y = ae^{bx}$ or $Y = a \log X + b$. By plotting the points on semi-logarithmic paper and fitting a straight line by the basic graphical method, a curve is obtained which, for the exponential case, gives least-square values for the deviations from log y, and for the logarithmic equation gives least-square values for the deviations from y.

Case 6—General Parabolic Curve

The observed points may frequently indicate a curve which is not symmetrical about the x- and y-axes, or does not pass through the origin, or have the form of a logarithmic or exponential curve. If it appears that it should be concave upward, and rising from left to right, try plotting values of x^2 against y and see if the points lie in a fairly straight line. If they still curve upward, a larger exponent may be tried. Conversely, if the curvature is downward, a fractional exponent is indicated, and if the curve is to slant downward from left to right, the exponent will be negative. Fig. 4 shows clearly the form of the curves belonging to this general category and the relation between the direction of curvature and the value of the exponent.

In any event the procedure is to choose arbitrarily the value of the exponent n in the equation $Y = aX^n + b$, plot the values of x^n versus y from the observation data, fit a straight line to this plot, read off on this straight line the values of Y that belong with the various x^n values, and plot these against x to form the final curve. An example will make this clear. Fig. 5-*a* shows by means of solid dots seven observations ranging from $x = 2$, $y = 1$ to $x = 20$, $y = 11$. The general location of these points indicates a positive fractional value for the exponent n, say, $n = {}^1/_2$. The observed values of x are accordingly raised to the one-half power and plotted against the observed values of y, giving the solid dots in Fig. 5-*b*, which lie in a flat S-curve that can readily be correlated with a straight line without excessive deviations. The straight line CD, obtained by the basic method, is drawn in Fig. 5-*b*, and the Y-values pertaining to the plotted $x^{1/2}$-values are shown by small circles. When these have been transferred to Fig. 5-*a*, the locus for the required curve AB has been duly obtained. The equation of the curve is $Y = aX^{1/2} + b$, or $a^2X = Y^2 - 2bY + b^2$, in which a is the slope of the straight

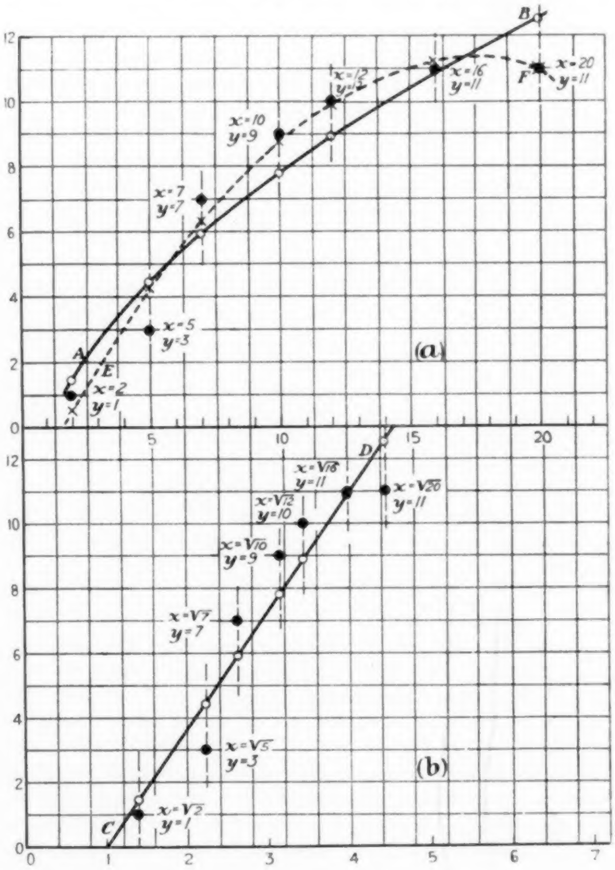

Fig. 5

line CD (with due regard to possible differences in the horizontal and vertical scales), and b is the intercept of CD on the y-axis.

Curve EF in Fig. 5-*a*, which fits the observed points more closely than AB but has certain offsetting disadvantages, will be referred to at the close of the paper.

Case 7—Sine-Cosine Curve

This curve, the last to be discussed in the present paper, differs in several respects from those that precede it. Hitherto, all the curves have been derived from a basic straight line, fitted to

a series of points by what may be termed a standard method. In the case of the sine-cosine curve the normal equations are markedly different; the only similarity lies in the device of shifting the x- and y-axes in order to simplify these equations and in limiting the number of constants in the empirical equation to two. In order to avoid the presence of three or more constants, it is assumed that (a) the period of frequency of the wave is known, and that (b) the x-axis is so located that the mean of all the y-observations is zero. The unknown constants to be determined are thereby reduced to the amplitude and the phase of the periodic curve.

To locate the new y-axis, the observed data[5] are plotted on (Fig. 6-c), and the same process of ordinate marking and summation is performed, giving the horizontal line DF. Sometimes, as in Fig. 6-c, $DF = O$. This construction determines the angle EFD, the bisector of which gives the angular displacement of the new y-axis from the original axis. In Fig. 6-c angle EFD = 270 deg.; hence, the new y-axis, shown in Fig. 6-c, is located to the right of the original y-axis at a distance $c = (135/360) \times AC$.

The construction of the final empirical curve is accomplished in two steps: in the first, the amplitude of the sine component is obtained, and in the second, that of the cosine component. The resultant is found by plotting the components and simply adding

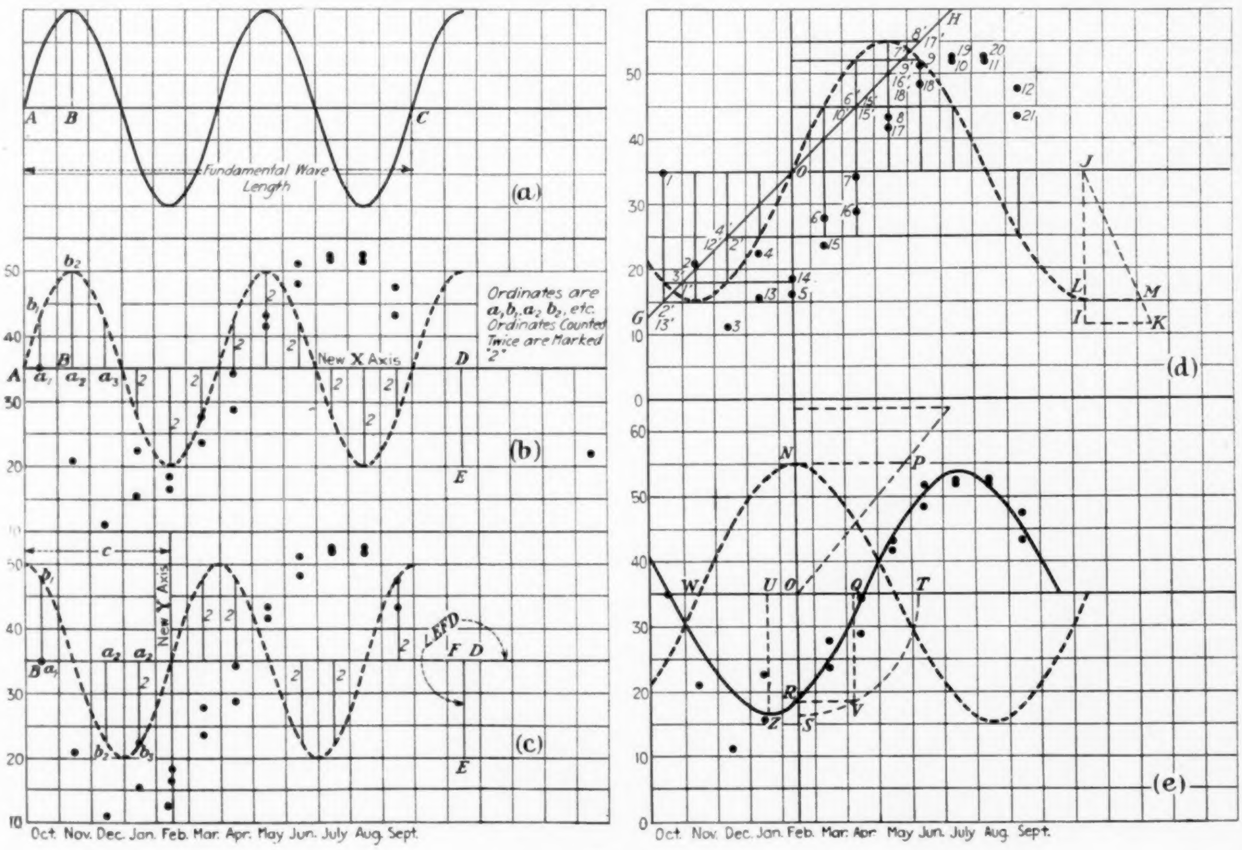

FIG. 6

transparent tracing vellum, and a double-frequency sine curve of any desired amplitude is laid out in ink or soft pencil on a separate sheet of paper (so that it will be visible through the vellum), using either the table of functions or the standard graphical method for its construction. It should extend for at least $2^1/_4$ wave lengths and have the first quarter wave length accurately marked (AB, Fig. 6-a). This is then placed under the plot of observed values, making A coincide with the origin of coordinates (Fig. 6-b); the ordinate passing through each point is noted; and all the ordinates are added algebraically with dividers and the sum laid off vertically at DE (upward if positive and downward if negative). Then the tracing vellum is shifted to the left so that B coincides with the origin of coordinates

[5] Data taken from a forest and stream-flow experiment at Wagon Wheel Gap, Colo., by the U. S. Forest Service and Weather Bureau. To make the problem more typical, a limited set of readings were used, running from January, 1911, to September, 1912. Ordinates are monthly mean temperatures; abscissas are months.

then graphically, or by adding the two amplitudes vectorally, determining the phase of the resultant, and plotting a single sine curve to fit these conditions.

Fig. 6-d illustrates the first step. A sine curve of fundamental frequency and any convenient amplitude is drawn up on a separate sheet and slipped under the transparent plot, making its axis coincide with the new x-axis and its origin with the new origin O of the plot. A 45-deg. line GH is also drawn through O. Then ordinates are drawn from each of the plotted points 1, 2, 3, etc., to the sine curve, and from their intersections with this curve are drawn corresponding abscissas to the new y-axis. The intersections of these abscissas with GH are numbered 1′, 2′, 3′, etc., the primed numbers each being related to the corresponding original numbers. The planimeter is now used to measure and sum up a series of rectangular areas, one for each plotted point, thus: Start tracing at O, go down to the abscissa through 1′, over to GH, straight up to the new x-axis, and back to O; repeat for the other points, always starting out on the new

y-axis and returning to O on the new x-axis. The final result is laid off vertically from the x-axis at a point where the underlying sine curve has its full amplitude, and any convenient scale is used (see IJ, Fig. 6-d). Then another series or rectangles is summed up, by starting the planimeter at O, going down to the abscissa through 1, across to the ordinate through 1′, up to the new x-axis, over to O, and so on for all the other points. Here again it is necessary to start tracing each rectangle on the new y-axis, as a result of which it will be found that some of the rectangles will be traced counterclockwise. It is therefore well to note the reading of the planimeter each time that the tracing point arrives at O, so that in case the total area is negative its true value may be found by subtracting the final reading from the maximum scale graduation of the planimeter. In Fig. 6-d this final reading is positive and is laid off horizontally as IK, to the same scale as IJ. Horizontal line LM, determined by the two legs of the triangle IJK and the point L where the sine curve intersects, IJ, is then the amplitude of the sine component of the final empirical curve.

The cosine component is determined in exactly the same way, except that the underlying curve is moved along so that its highest point coincides with the new y-axis (Fig. 6-e). The amplitude of this component for the illustrative problem is shown at NP; it is negative in sign.

To combine the two components graphically without plotting either one, lay off $OQ = LM$ and $OR = NP$. Measurements up and to the right of O are positive; down and to the left are negative. Draw arc ST with O as center and OV as radius, measure arc SV with a protractor, lay off UO so that UO/WO = (arc SV)/90°, and locate Z at the intersection of horizontal and vertical lines through S and U; Z is then the minimum (or maximum) point on the required empirical curve, and since the wave length and axis of the curve are already known, it can be plotted by simple geometrical means.

Conclusion

In conclusion, a few general rules will be given that apply with equal force to all types of curve plotting.

1 Do not extend a curve by extrapolation more than 10 per cent at either end.

2 If observations are of unequal weight, multiply the weights by the least common factor that will make them all integral, and then consider that each point is replaced by several discrete but coincident points, equal in number to the weight of the point in question.

3 When an empirical relation between two sets of observations is derived by applying a known mathematical or physical law, it makes some difference whether the law is applied to each pair of observations individually or to a primary empirical relation between the observed quantities; e.g., the water rate of a steam turbine at different loads is not found by observing loads and corresponding pounds of steam per kilowatt-hour, but by observing loads and total steam consumptions per unit of time. Usually these latter observations are individually divided by the loads, and the resulting points of pounds per kilowatt-hour versus load are used as the basis of an empirical water-rate curve. However, it would be slightly more logical to find an empirical curve for the relation of load to total steam consumption, and then derive the water-rate curve from this primary curve by dividing its ordinates by the corresponding loads.

4 In all the cases described in this paper, except Case 2, it is assumed that the y-observations alone are subject to error. Hence, in plotting observations in which both sets are inexact those which are most nearly correct should be plotted as abscissas.

5 The number of arbitrary constants in any empirical equation should be as small as possible consistent with good correlation. This somewhat begs the question, since there is no absolute standard of correlation. In the theory of statistics a relative measure of correlation is found by comparing the standard error of the assumed line with that of a horizontal line passing through the mean of the y-values. It may be stated as an unprovable but common-sense principle that the use of more than two constants in the equation is not justified unless they are needed in order to make the "index of correlation,"[6] as it is called, greater than 85 per cent, the maximum value with perfect correlation being 100 per cent. In Fig. 5-a, curve AB, representing an equation with two constants, has an index of correlation of 95.45 per cent. Curve EF, with three constants calculated by solving three simultaneous normal equations fits the points slightly better (i.e. = 98.74 per cent), but the peak near the right end suggests a downward trend which is not justified by the observed data. A somewhat rougher approximation, such as is furnished by curve AB, is in reality far more useful.

Waste-Heat Recovery

A PAPER on this subject presented at the World Fuel Conference in September by F. J. Bailey, W. Gregson, and J. W. Reber dealt with the recovery of waste heat by its return to the furnace by means of regenerators and recuperators, and, alternatively, by utilizing it for steam raising. With furnaces heated by producer gas, the authors said, the volume of air was only about half that of the products of combustion, and as the gaseous fuel entered the furnaces at a high temperature it was not possible for the ingoing air to take up more than about 50 per cent of the waste heat in the products of combustion. When low exit-gas temperatures were claimed with regenerators, it was necessary to verify the CO_2 contents of the gas; otherwise the low temperatures might merely denote the infiltration of a large quantity of cold air. In recuperators the wall separating the hot gas flow from the air flow was generally of brickwork, though heat-resisting metals were now being used. In practice only from 30 to 40 per cent of the heat of the gases could be recovered in the air.

In regenerators with a waste-gas inlet temperature of 1000 deg. cent. and half-hourly reversal periods, 1 ton of checkerwork would heat about 80 lb. of combustion air per hour, or roughly 1000 cu. ft. from 20 deg. cent. to 950 deg. cent., as well as about 950 cu. ft. of producer gas. Recuperators, which were less efficient than regenerators, were more suitable for smaller furnaces in which the combustion temperatures required did not exceed 1360 deg. cent. Recuperators of refractory material occupied more space than regenerators and were more difficult to repair. An average British 60-ton furnace giving thirteen casts per week of 144 hours would allow 2.8 lb. of steam to be raised in a waste-heat boiler, assuming the furnace producer to consume 6 cwt. of fuel per ton of steel. Allowing for the waste heat of the soaking pit and reheating furnaces, it was practicable to raise 3000 lb. of steam per ton of finished steel; this steam being capable of developing 200 hp. In cement works, waste-heat boilers could be installed with advantage, and actual instances of heat recovery ranged from 348 lb. to 385 lb. of steam per barrel of cement made. The use of waste-heat boilers to recover the heat in the exhaust of gas engines gave from 2.0 lb. to 2.5 lb. of steam per b.hp-hr. of the engine.

For most of the cases of waste-heat recovery, especially in connection with regenerative furnaces, the fire-tube boiler held an unchallengeable position, and in the opinion of the authors should always be used when the waste-gas temperatures were below 1000 deg. cent.—From report in *The Engineer* (London), Oct. 12, 1928, p. 399.

[6] "Statistical Methods," p. 436.

Economic Aspects of the Shipment of Materials on Skid Platforms

By C. B. CROCKETT,[1] NEW YORK, N. Y.

This paper presents some of the economic aspects of the above method viewed purely from the standpoint of the shipper or receiver of the material. The method is described both as to equipment, its uses, and the relation to the manufacturing processes. A comparison is made between the total cost of physical distribution and the cost of freight transportation only, pointing out the small influence of the latter factor in the total cost. The field of savings is then discussed, including labor costs, speed of car loadings, the container or skid, and the damage to material. These are illustrated with actual instances which have occurred in various industries.

The paper concludes with a treatment of the possible growth of the system and the four main factors which may influence its more general adoption.

THE purpose of this paper is to discuss some of the economic aspects of the method of shipping various commodities on skid platforms. The author will attempt to treat the subject from the standpoint of a user of this method, and will outline the factors to be considered and the results which have and may be obtained.

How the Method Differs From Present Practice

The essential factor in this method is the introduction of a container for shipment which adapts itself to mechanical handling in and out of box cars. Commodities which may be shipped in gondola cars or on flat cars may be handled mechanically by the use of overhead or traveling cranes. This equipment is impossible to use with the ordinary box car, and even with the use of portable conveyors there is still a large amount of hand labor in the placing or removing of the material in or from its location in the car. The only practical means (or at least the most generally accepted means) of mechanical handling in and out of box cars is by hand, electric, or gasoline-powered industrial lift trucks. All of these types of lift trucks have a common characteristic in that they multiply the capacity of the workman and have the improvement over the fixed-platform, or "load-carrying" truck (either hand or powered) in that they pick up the load mechanically and in the minimum time. The requisite for handling with this type of equipment is that the load be carried in a container that has a clear space underneath that will allow inserting the platform of the truck underneath the load. If a packing case has legs it has then become a skid box. The general practice today is to load the skid platform or skid box at the completion of the manufacturing process, storing the material in the same container, and upon shipment transfer the loaded skid to the car. If a platform is used for such material as kegs or small boxes, these are generally wired or strapped together, but do not have to be secured as strongly as one would suppose because the entire load is generally secured after the car is loaded.

This method demands a revision of two elements of management, or better, a revision of the manufacturer's conception of two units in his process. The first idea that is changed by this method is that regarding the size of the unit which he is to consider in his handling, storage, and shipping problems. The capacity of a machine is reckoned in the number of finished units that can be turned out. If these parts are small and are loaded into a container or skid box, the unit changes, and from that point on is the skid load, which may contain a thousand of the small parts. If the material has formerly been shipped as separate pieces the change is not difficult to accomplish, but if it has formerly been packed and shipped in containers such as cartons, boxes, or bags, and fifty of these now compromise a "skid load," the saving from handling in these larger units, although apparent, is not so easily appreciated or measured.

The second change that takes place in the adoption of this method is a revision of the dividing line between production and distribution. The manufacturing executive must be willing to examine his distribution costs with the same sharp scrutiny and the same rules for economy that he applies to his production process. The process of distribution, and by that is meant only physical distribution or the process of getting the material from the end of the production line to the hands of the consumer, can be divided into two general classes of work: one the transportation of the goods from one place to another, and the other the handling or rehandling of the goods at the start, the end, or at intermediate points along the journey where there is a change in the method of transportation. To eliminate a rehandling or to reduce the handling to only a fraction of its former cost plays the same part in reducing the cost of physical distribution that is performed by the elimination of a manufacturing process in the course of production. The cost of physical distribution starts the moment the finished material leaves the production line; it includes the moving in and out of finished stores, the loading of the freight car, and the unloading at the plant of the receiver, and his cost in the moving in and out of raw material or incoming stores; and does not cease until the material is actually used by him. If the modern plant can ship goods in a manner which will reduce the handling costs of the receiver, this is an added incentive to buy.

Course of Material With and Without Use of Skid Platforms

Tracing the course of material in detail along the road of physical distribution and assuming that this material is in fairly small units but is not shipped on skid platforms, the following steps are as shown in the upper line of Fig. 1: (1) Upon completion of the manufacturing process the material is loaded on a hand truck or other means for (2) transporting it to finished stores; (3) upon arrival it is unloaded and remains in storage until ready for loading. It is then loaded (4) upon some transfer agency which (5) carries it to the car or into it, where it is again (6) unloaded and placed in the car and (7) shipped to the purchaser. Upon the arrival of the car at destination the material is (8) unloaded from the car and placed on something which (9) transports it to incoming stores where it is (10) unloaded and placed in storage. When the material is to be used it is once more (11) loaded and (12) conveyed to the start of the process, where for the last time it is (13) unloaded as it enters the manufacturing process. In the case of warehouses, jobbers, or wholesalers handling finished merchandise, operations (8) to (13) comprise the entire process of the plant, the goods being transferred

[1] The Society for Electrical Development, Inc.

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to outbound carrier instead of to start of process. As previously mentioned, a reduction in rehandlings would have a most pronounced effect on the operating cost of this type of business. In the process outlined above the material has been loaded or unloaded eight times, has been transferred five times, and of the total of thirteen steps only one has been the movement of the freight car from shipper to receiver. The lower line of Fig. 1 shows the elimination of operations 3, 4, 6, 8, 10, and 11 by the shipment and storage of material on skid platforms.

This leads us to examine the relative importance of the actual rail movement as a factor in the cost of getting goods from the point where the supplier has finished his useful work on the material to the point where the receiver can make use of it. The New York Central Railroad in a survey of several commodity groups now being handled in and around plants by lift trucks and skid platforms found that the average cost for freight movement on a haul of 240 miles was 74 cents per ton, while the loading cost for these same groups was 74 cents per ton and an equal cost for unloading. The loading and unloading of the freight car was therefore $1.48 per ton, and if only one-half that sum is used for the loading and unloading into stores at the plant of the shipper (no bracing being necessary in the latter case), and an equal amount for handling in the plant of the receiver, the total handling cost is $2.96, exclusive of the cost of transportation within the plant. Comparing this figure of $2.96 per ton with the cost of the freight-car movement which was 74 cents per ton, it is seen that freight rates have a position of prominence in the mind of the average manufacturer which is not warranted by the facts. A 25 per cent reduction in the handling cost at the two ends of the rail journey would pay the entire cost of the freight. Or the same saving would allow the distribution radius to be doubled with the same total cost.

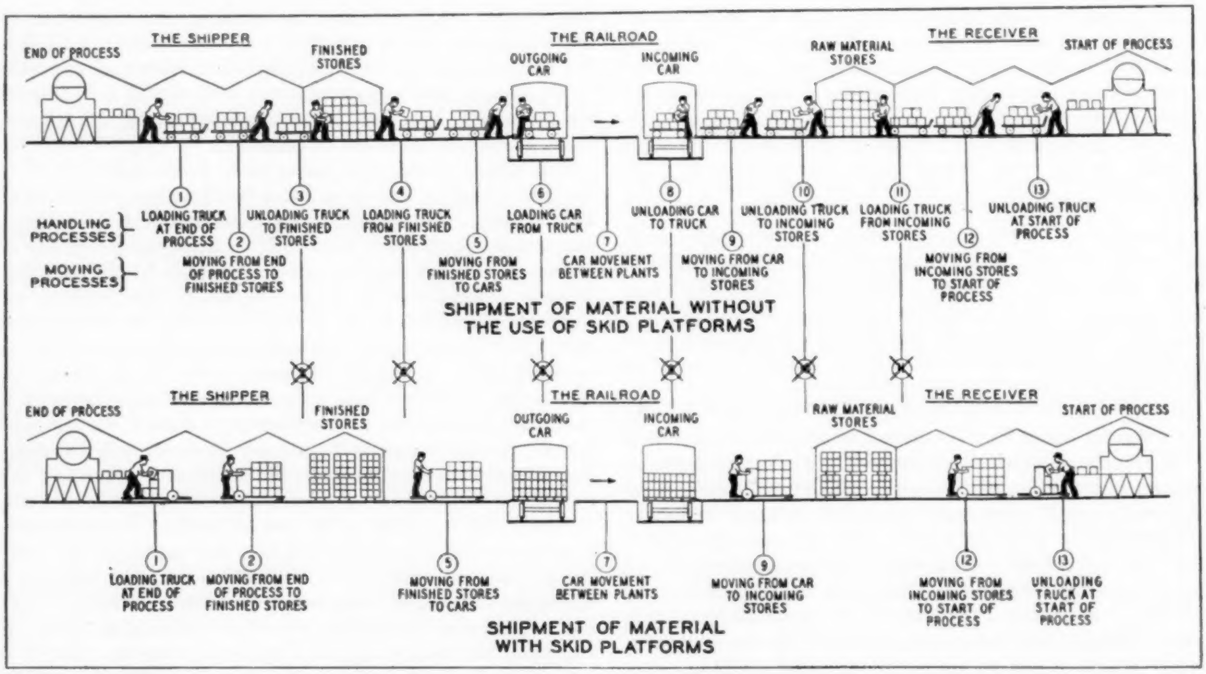

Fig. 1 The Operations Involved in the Physical Distribution of Goods With and Without the Use of Skid Platforms

Savings Possible Through Skid Shipment of Material

There were loaded in 1927 about 19,400,000 carloads of freight exclusive of bulk goods such as coal, grain, liquids in tank cars, etc.; and if average car loadings reached 30 tons per car the loading and unloading charges for these cars regardless of the handling within the plant totaled some $870,000,000. That this figure is possible of very radical reduction through the skid shipment of material is readily appreciated when the actual experiences of individual firms are related. The figures for these various concerns, however, are in general only those of direct labor, and other economies are often effected which cannot be measured in dollars and cents. The results of the system may best be discussed before the actual examples are quoted.

First of all, of course, is the direct saving in the labor involved in the loading of the car. A power lift truck can theoretically multiply the capacity of the worker twenty-four times, this figure being derived from the fact that the truck can carry eight to ten times the weight it is possible for a man to transport at approximately three times his speed. The reduction in labor should therefore be 96 per cent. It would not be expected that this theoretical limit could be reached, for it requires the actual running of the truck for 100 per cent of the time, a condition seldom met in actual practice. It is interesting to note, however, that where figures are quoted for the expense in loading actual cars the saving is often found to be between 90 and 97 per cent.

Another saving that will be divided between the shipper or receiver and the carrier is the faster time of unloading or loading and the increased usefulness of the transportation equipment. The effort of the railroads to decrease demurrage and increase the car-miles per day is sufficient proof of the importance of this factor in rail transportation, and as the overhead expense of a motor truck is in the neighborhood of 6 cents per minute, an appreciable saving may also be realized in this method of transportation.

From a superficial study of the problem it would at first appear that the savings might be eaten up in the increased cost of the container or skid platform. However, in practice this does not seem to be the case. In some instances the skid-platform method has actually shown a very decided decrease in the cost of the container over the old method. For light materials the use of the non-returnable skid is recommended. The cost of this type

of skid varies from 40 or 50 cents up to $4 or $5, depending on the material and the economical size of the skid load. For heavier materials it is advisable to use the returnable type of skid or skid box, the latter being employed where the material is in small units and can be loaded loose in the box. The returnable skid ranges in cost from $6 or $7 up to as high as $30.

A saving that has been the determining factor in several installations has been the lessening of damage to the product in shipment. This saving has come both from less damage being incurred while in transit and from a radical reduction in the goods damaged during the handling incidental to the shipping.

Examples Illustrating Possibilities of System

Regarding the saving in direct labor in the loading of the car and the lessening of the time that the car is tied up, there are several examples. The general stores department of the Chicago, Milwaukee, St. Paul, and Pacific Railroad load 50,000 lb. of castings with one man and a truck in 25 minutes. Fig. 2 shows the same operation as conducted by the Illinois Central Railroad. At 40 cents an hour for the man and 50 cents an hour for the truck, the total loading cost is $37^1/_2$ cents, or $1^1/_2$ cents a ton.

The Hupp Motor Car Corporation at Detroit receive crankshafts on special skid racks as shown in Fig. 3. It formerly took 8 men $7^1/_2$ hours to unload a car, the cost being approximately $24. The same task is now accomplished by one truck with driver and helper in 45 minutes. The present cost is 98 cents, and the unloading dock is cleared for a second car the same day.

Fig. 2 Loading a Car of Small Castings in Skid Boxes
(The 50,000-lb. car is loaded by one man in 25 min.)

The Champion Coated Paper Company cut their direct labor cost 93 per cent. It formerly required 7 men 3 hours to load a car of flat stock which is now loaded by a truck and a man in 45 minutes. It should also be remembered that the above figures are for only one operation and that in the railroad part of the journey alone there would probably be an equal saving at the other end, and that this operation may occur as many as five times along the entire route of physical distribution.

Regarding the cost of the container: The West Virginia Pulp and Paper Company now ship flat stock on a nailed skid that is destroyed upon arrival. The cost of the skid is $2.25. A packing case formerly used, and which cost $4, contained only two-fifths the weight of paper.

The Jos. Dick Company, manufacturers of farm machinery, whose product is quite expensive, state that the chief reason for the use of skids in shipping is to reduce the damage incurred in handling during transit. This statement is made with the knowledge that they have saved from 15 to 20 man-hours in the loading of each car.

From the standpoint of the common carrier the author would quote W. E. Phelps of the New York Central Rairoad to the effect that freight-handling costs have been reduced from 88 cents to 32 cents at two of their terminals where lift trucks and skid platforms are employed.

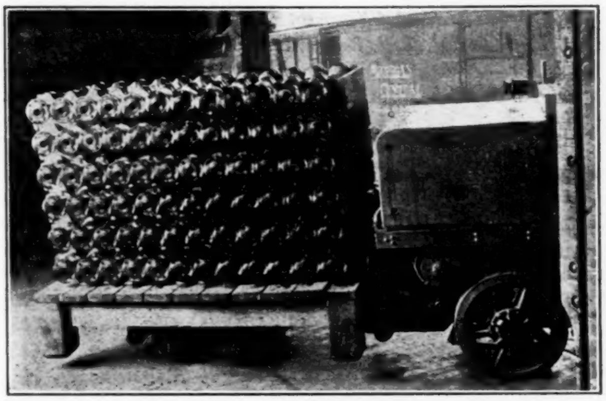

Fig. 3 Special Skid Rack Used by the Hupp Motor Car Corp. for Shipping Crankshafts
(The labor cost for unloading these cars was cut 96 per cent by the use of this rack and an electric lift truck.)

Coordination of System With Methods of Handling Within the Plant

The growth of this system and the resulting economies seem to be dependent on four main factors: first, the breadth of application of the system to different commodities; second, the coordination of the system to the methods of handling within the plants of various manufacturers; third, the attitude of the railroads and other carriers; and fourth, the degree of interchangeability developed in the skid platforms and trucks. As to the breadth of application to different commodities, the stores department of a large railroad handles over 100,000 different items in a year and the assistant storekeeper states that 80 per cent of the material is shipped to local storerooms on skid platforms or in skid boxes. The Detroit and Cleveland Navigation Company, with a very wide variety of materials handled, are able to use skid platforms or boxes for 40 per cent of their tonnage.

As to the subject of interior plant transportation, several large automobile concerns are operating on a few days' supply of raw materials and have eliminated incoming stores entirely, the material being loaded on skid platforms immediately upon arrival and transported directly to the point of use. One concern which developed such a system of handling with skids and electric lift trucks said that their savings had amounted to $48,000 in the first three months.

The aid and cooperation of the railroads and other carriers are dependent on the individual initiative of the individual companies. The question of the actual freight rate is not of such great importance in the total cost of physical distribution, as it does not exceed 15 per cent. There is, however, an opportunity for the railroads to study the rates to be charged for return shipments of skids. That one company has gone so far as to supply a shipper with skids free of charge shows that it must be an economical practice from the standpoint of the carrier. The more general adoption of the system for L. C. L. freight will not only reduce the handling cost of this class but will set an example to the shippers of carload lots.

Instruments and Apparatus

Preliminary Draft of Part 6—Electrical Measurements

The Main Committee on Power Test Codes takes pleasure in presenting to the members of the Society for criticism and comment, Part 6—"Electrical Measurements" of "Instruments and Apparatus." The Individual Committee which developed this draft consists of Messrs. C. F. Hirshfeld, Chairman, W. A. Carter, Secretary, C. M. Allen, E. G. Bailey, L. J. Briggs, C. R. Cary, J. D. Davis, R. E. Dillon, F. M. Farmer, J. B. Grumbein, W. H. Kenerson, E. S. Lee, O. Monnett, S. A. Moss, R. J. S. Pigott, E. B. Ricketts, and J. T. Ward.

The Instruments and Apparatus Section will consist of twenty-two parts dealing with the following subjects: (1) General Considerations,[1] (2) Pressure Measurement (6 chapters):[2] (3) Temperature Measurement (12 chapters);[3] (4) Head Measurement, (5) Measurement of Quantity of Material, (6) Electrical Measurements, (7) Mechanical Power, (8) Measurement of Indicated Horsepower, (9) Heat of Combustion, (10) Chemical Composition (5 chapters), (11) Quality of Steam, (12) Time Measurements, (13) Speed Measurements, (14) Mechanical Measurements, (15) Surface Area, (16) Density, (17) Viscosity Measurements, (18) Humidity, (19) Concentration of Dilute Solutions, (20) Smoke, (21) Leakage Measurements (2 chapters),[4] and (22) Hydraulic Power Plants.

Complete copy of the draft which is published here in abstract may be obtained from the Society's headquarters. The Individual Committee, the Main Committee, and the Society will welcome suggestions for corrections or additions to this draft from those who are especially interested in this subject. These comments should be addressed to the Chairman of the Committee in care of The American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

Introduction

1 The purpose of Part 6—"Electrical Measurements,"[5] of "Instruments and Apparatus" is to give general information about electrical measuring instruments and testing apparatus and their use in testing electrical equipment. More detailed information and data in regard to the more special or unusual tests which are sometimes required will be found in the literature on the subject, a restricted bibliography of which will be found at the end of this part.

The more specific and detailed instructions which may be important for the conduct of certain tests are given in the Codes dealing with such tests.

2 The treatment of this part has been divided into twelve sections as given in the table of contents (not included here—Editor.)

Section I—General

3 *Units and Standards.* The measurement of any electrical quantity is the comparison of that quantity with another quantity of the same kind which has been chosen as a unit. The fundamental or basic electrical units are based on the centimeter-gram-second system of absolute units—a system that has been established on the theory that all physical phenomena are the result of matter and motion, that is, space (centimeters), mass (grams), and time (seconds).

4 *Two sets of absolute electrical units* have been established: one based on electromagnetic laws and the other on electrostatic laws. The latter is rarely used and all ordinary electrical measurements are based on the electromagnetic system.

5 The absolute electrical units are difficult to reproduce experimentally by reason of their magnitude which is often extremely large or small, and by reason of the nature of the experiments by means of which they are defined. Because of this all electrical quantities are now measured in "international units" which were adopted at an International Conference in London in 1908. These units are practically exact multiples or sub-multiples of the absolute c.g.s. units, the deviations being of the order of a few parts in 10,000.

6 The international units of the electrical quantities are:

Electromotive force and potential difference (voltage)	volt
Resistance	ohm
Current	ampere
Quantity	coulomb
Power	watt
Energy	joule (watt-second)
Capacitance	farad
Inductance	henry

7 *Standards are of two classes*—primary standards and secondary or reference standards. Primary standards are, in general, those which represent by definition the international units—for example, the mercury ohm standard. Secondary or reference standards are the more practicable working standards which are standardized by comparison with primary standards. Primary standards are usually maintained only by the government custodians of standards in the various countries, while secondary or reference standards, such as standard resistors, which are based on these primary standards, serve as the basis of practical measurements in engineering and commerce.

8 *Classes of Electrical Measuring Instruments.* Measurements in the engineering field of the more usual electrical quantities, such as voltage, current, power, and energy, are usually made with indicating, curve-drawing, or integrating instruments. These are available in various forms which are generally classified as standard instruments, portable instruments, and switchboard instruments. "Standard instruments" are high-grade, high-accuracy, indicating instruments which, while more or less portable, are intended primarily for the laboratory. So-called "portable instruments" are somewhat less sensitive, but are strictly portable and specially applicable to general testing work, particularly outside of the laboratory. "Switchboard instruments" are designed for permanent mounting on switchboards along with the equipment by means of which electrical apparatus is

[1] This part was published in the February, 1923, issue of Mechanical Engineering.

[2] Chapter 1 of Part 2, on Barometers, was published in the November, 1927, issue of Mechanical Engineering.

Chapter 6 of Part 2, on Tables, Multipliers, and Standards for Barometers, Mercury and Water Columns, and Pressure Measurements, was published in the July, 1928, issue of Mechanical Engineering.

[3] Chapter 1 of Part 3, General, was published in the December, 1925, issue of Mechanical Engineering.

Chapter 6 of Part 3, on Glass Thermometers, was published in the April and May, 1926, issues of Mechanical Engineering.

Chapter 7 of Part 3, on Pressure-Gage Thermometers, was published in the October, 1928, issue of Mechanical Engineering.

[4] Chapter 1 of Part 21, on Condenser Leakage Tests, was published in the November, 1925, issue of Mechanical Engineering.

[5] This part has been endorsed by the Standards Committee of the A.I.E.E.

controlled. They have to withstand severe conditions, such as being in the circuit continuously and the vibration which may exist. Therefore they are more sturdy and somewhat less accurate than the portable form.

9 Portable indicating instruments are the most suitable class and form for general testing of electrical equipment. They have the best combination of the important characteristics of sturdiness, portability, accuracy, and reliability. Where measurements must be made over a long period of time and it is not feasible to make continuous observations of indicating instruments, curve-drawing instruments may be employed but with the sacrifice of some accuracy. Of course, in the measurement of integrated quantities such as ampere-hours and energy (kw-hr.), integrating instruments, usually called "meters," are employed, in which the total quantity to any given instant is indicated on a dial register.

Range and Accuracy

10 The range of an electrical instrument, such as a voltmeter, ammeter, or wattmeter, is not a restricted quantity, because the judicious use of shunt or series resistors or of instrument transformers permits a conveniently flexible variation in range.

Table 1 Accuracy of Result to Be Expected From Calibrated Instruments

Quantity measured and instruments used	Limits of error, in per cent of full-scale deflection, for self-contained instrument	Limits of error, in per cent, when used with auxiliary apparatus[1]
Voltage (Voltmeter)		
Portable, d.c.	0.25	0.25
Portable, a.c.	0.25	0.25
Switchboard, d.c.	0.5	0.5
Switchboard, a.c.	0.5	0.5–0.75
Curve-drawing	1.5	1.5–2.0
Current (Ammeter)		
Portable, d.c.	0.5	0.5
Portable, a.c.	0.5	0.5–1.0
Switchboard, d.c.	0.75	0.75
Switchboard, a.c.	0.75	0.75–1.25
Curve-drawing	1.5	1.5–2.0
A.-C. Power (Wattmeter)		
Portable	0.25	0.25–1.0
Switchboard	0.5	0.5–1.25
Curve-drawing	1.5	1.5–2.0
Energy (Watthour Meter)		
Direct current	1.5	1.5–3.0
Alternating current, single-phase	1.0	1.0–2.0
Alternating current, polyphase	1.0	1.0–2.0
Frequency (Frequency Meter)		
Portable	0.5	0.5
Switchboard	1.0	1.0
Power Factor (Power-Factor Meter, above 50 per cent)		
Portable	0.25	1.0
Switchboard	1.0	2.0
Computed from wattmeter, voltmeter, and ammeter readings	1.5	2.0
Resistance		
Low: Fall-of-potential method	0.5	...
Kelvin bridge method	0.02	...
Medium: 10 to 10,000 ohms with high-grade Wheatstone bridge	0.02	...
Less than 10 ohms or over 10,000 ohms, with high-grade Wheatstone bridge	0.2–1.0	...
High (insulation measurements): with portable bridge	5.0	...

[1] Auxiliary apparatus: shunts, multipliers, or instrument transformers.

11 The accuracy obtainable in the measurement of an electrical quantity, as of any other quantity, depends upon various factors which enter into the determination, such as correctness of the method, constancy of the quantity being measured, accuracy of the instruments employed, number and magnitude of the unavoidable errors, and correctness of the calculations. Table 1 indicates in a general way the accuracy of the final result which reasonably may be expected with various instruments to which calibration corrections have been applied, as ordinarily used by average observers in testing electrical apparatus under ordinary conditions. Where special care is taken by experienced observers, the values given may be reduced as much as 50 per cent.

12 *Selection of Instruments.* A test often represents considerable money value either because of a bonus or penalty, dependent upon the results, or because of the investment in labor represented. The latter becomes a total loss if it is necessary to repeat the work due to errors made in the test. It is evident that in such cases it is good economy to take great care in selecting the instruments to be used; and in any test, instruments should be chosen which are accurate and reliable so that the result obtained may be used with confidence. If possible the calibrating record for several months back should be scrutinized; erratic performance or a recent change in calibration constitutes grounds for rejection. The zero indication should be stable; there should be no signs of friction at any part of the scale; and operation at full load for a reasonable period of time should not alter the accuracy. The ranges should be selected, if possible, so that the readings will be in the upper parts of the scales. In this respect, multiple-range instruments are specially desirable. It is preferable that the graduations of scales should be "open" throughout, that is, not restricted at the ends, especially the lower end. The scale factors should be decimal multiples or numbers which make for easy computation.

13 *Transportation of Instruments.* Care should be taken that calibrated instruments are moved to the test positions from the laboratory without impairing their calibrations. They should be laid on the floor or table without jarring; a fall through a few inches may cause a conical pivot to produce sufficient unit stress to crack a jewel bearing. An instrument may be damaged by the vibration of a car floor; if many instruments are to be carried considerable distances, it is well to use strong wooden boxes lined with heavy felt. When instruments are carried by their handles, the weight of the moving system is usually removed from the pivot points, but this cannot be insured when they are packed. Rotating standards usually have means for taking the weight of the rotating element off the bearing before the meter is removed; care should be taken to see that this is done. The packing should be such as to preclude relative motion of the instruments in the packing box. Instrument transformers are best shipped in boxes separate from instruments.

Installation

14 *Arrangement.* In testing electrical apparatus, it pays, as in most undertakings, to remember the old adage that what is worth doing at all is worth doing well. Even though the testing equipment is to be installed in the most temporary manner, there is no good reason why results should not be obtained as reliable as with the most elaborate installation. The set-up can be arranged in a neat and workmanlike manner with little extra cost of time or money, and by so doing, much time may be saved later when, for example, it becomes necessary to

make quick changes in the layout or trace out the wiring to find the cause of trouble. Furthermore, the psychological effect of a neat installation in inspiring careful work on the part of the instrument observers and others connected with the test is of significant value.

15 In the first place, the purpose of the test should be clearly understood and the proposed procedure carefully thought out and planned beforehand. Instruments should be placed on a firm and steady table, bench, or box which is reasonably level, the switches conveniently located, and the wiring neatly and logically arranged. Instruments and switches should be conveniently located to facilitate reading and to reduce the chance of errors due to manipulating the wrong switches. In tests of several hours duration, the arrangement should be such that the observers will be reasonably comfortable, because bodily discomfort will unconsciously have more or less effect on the care with which readings are taken. Additional detailed instructions for the conduct of tests are given in many of the Codes dealing with the more important tests. For example, see Par. 21 of the "Test Code for Steam Turbines."

16 *Location in Circuit.* All measurements should be made at such points in the circuit that there will be no question as to the correctness of the results. That is, current connections for ammeters and wattmeters should be made at a point where the current is the same as at the machine terminals, while voltage connections should be made at the machine terminals or at a point sufficiently close so that the intervening voltage drop is negligible. In general, all instrument connections should be made as near to the machine terminals as possible, because all performance guarantees and data are usually given for measurements at the terminals.

17 The table, bench, or box on which the instruments are located should be placed within sight of the apparatus under test whenever feasible, so that the testing engineer can observe the operation of the machine at all times. [But see also Par. 18(*l*).]

Precautions in Taking Readings

18 The following precautions should be observed in setting up and using electrical instruments for input or output measurements of electrical apparatus:

(*a*) Indicating and curve-drawing instruments should be of such a range that the quantity being measured will produce a reasonably large deflection, preferably more than half-scale as the observational error expressed in per cent decreases in direct proportion to the increase in the magnitude of the deflection.

Integrating meters should be of such a range that the loads will come between 30 and 120 per cent of the rated capacity of the meter.

(*b*) Reliance should not be placed on a single observation. When making direct measurements, such as voltage, more observations are required with a varying quantity than with a constant quantity, to give an average which is reasonably reliable. When making measurements for a derived quantity, such as resistance, observations should be made for several values of the quantities measured, thereby reducing the chance of accidental errors. For example, in measuring the resistance of a circuit by the fall-of-potential method, the result of one observation of amperes and volts is not as reliable as the mean of several observations, each taken with a slightly different current; noting, however, that the accuracy increases only as the square root of the number of observations. Or if a resistance is measured with a bridge, the average of several measurements with different settings is usually more accurate than a single measurement.

(*c*) The possible presence of external or stray magnetic fields, both direct and alternating, should always be considered. Such fields may be produced by current in neighboring conductors or buses on switchboards, by certain electrical machinery and apparatus, and by structural iron and steel in buildings. These fields introduce errors by combining with the normal fields of electrical instruments and thus increase or decrease the deflection. Commercial indicating instruments are now usually equipped with magnetic shields, but it is not safe to depend absolutely upon them. The instrument should be placed as far as possible from any suspected source of stray fields. In the case of electrodynamic instruments the presence of a disturbing external field with a horizontal component may be detected by noting the change in indication when the connection of the instrument leads is reversed. In the case of permanent-magnet instruments, the presence of a disturbing external field with a horizontal component may be detected by noting the change in the indication (assuming that the quantity measured and the field remain constant) when the instument is turned through an angle of 180 deg. In both cases the average indication will be the correct value.

Where an instrument must be used in the presence of a disturbing stray field, it may be possible to shield it by placing it in a wooden box lined and covered with laminations of soft sheet-iron or steel to a total thickness of $^1/_4$ to $^1/_2$ in., with a suitable opening in the top for observing the pointer. The instrument should be calibrated in the box exactly as used in the test.

(*d*) Although many modern portable instruments of the usual types are magnetically shielded, they are often influenced by stray fields produced by wiring which is close to the instrument.

If the wiring cannot be arranged otherwise, the field produced should be reduced to a minimum by twisting together, for a distance of three or four feet from the instrument, the two conductors of each circuit carrying any appreciable current.

(*e*) To avoid possible errors due to stray magnetic fields from the instruments themselves, they should not be placed close together. A safe rule is a distance of not less than 12 in. from center to center of adjacent instruments.

(*f*) Instruments with glass or hard-rubber covers should not be rubbed, especially with a dry cloth. The electrostatic charge thereby produced is often sufficient to change the deflection materially. If it should be necessary to rub the glass cover when readings are about to be taken, the electrostatic charge may be dissipated by breathing on the glass.

(*g*) Care should be taken that the introduction of instruments or other testing apparatus does not alter the quantities being measured or the circuit conditions. For example, the mistake has sometimes been made of using low-range instruments in the secondary circuit of a current transformer in order to secure a good deflection at light loads. It should be remembered that the impedance of otherwise identical ammeters or of the current coils of wattmeters varies inversely as the square of the rated current, so that the impedance of low-range instruments may be so high as appreciably to alter the ratio and phase angle of the current transformer.

(*h*) It is desirable, when feasible, to provide switches so that the instruments can be conveniently cut out of the circuit except when taking readings, provided this does not materially influence the quantities being measured. This reduces the danger of damage to instruments in case of trouble in the apparatus being tested, and possible errors due to temperature changes and spring set in instruments not intended to be kept continuously in the circuit. Furthermore, a switch makes the quick substitution of another instrument convenient and safe.

Instrument switches in the secondary circuits of current transformers should be so arranged that the circuit is never opened

when "alive," because of the high voltage which may be developed.

(*i*) Care should always be taken to see that all contacts are clean and that all connections are tight in order to avoid errors due to high contact resistance.

(*j*) When reading indicating instruments, it is desirable to tap the instrument gently to eliminate the effect of friction.

(*k*) Sufficient illumination should be provided so that instruments can be readily, quickly, and accurately read.

(*l*) When making a test in a power station or similar place, the instruments should obviously be located where there is as much freedom as possible from vibration, magnetic or electrostatic fields, and abnormal temperatures. Where excessive vibration cannot be avoided, the instruments should be placed on pads of sponge rubber, hair felt, or similar material.

(*m*) At voltages of 500 volts and above, the electrostatic attraction between moving and fixed parts may become serious. This attraction will disappear if the two parts are at the same electrostatic potential. When grounding is permissible, this can be done by connecting the circuit to earth at the point where the instrument is connected, care being taken that the moving-coil end of the instrument is on the ground side. When the instrument must be used at a high potential difference to ground, it must be thoroughly insulated from the ground and the moving element connected to the case or to an electrostatic shield around the instrument. Such a connection is a source of danger, and great care must be taken that the observer does not come into contact with the instrument or the shield. The latter may be conveniently made from ordinary iron wire netting.

CORRECTIONS

19 The zero setting of the instrument should be observed before taking readings. If the instrument has no zero adjustor or if the adjustor is not accessible to the observer, the necessary correction must be applied to the observed reading. If the instrument is provided with a zero adjustor, the pointer can be set on the zero mark and the observed reading will then be correct, provided there are no other corrections to be applied. The zero setting may be affected by temperature changes and by the position of the instrument and should therefore be checked before taking readings if either of these effects is subject to change. If the zero reading of an instrument is altered more than, say, one-half to one millimeter by tipping the instrument ten degrees in any direction from the normal (horizontal) position of use, the mechanical balance of the moving system is not sufficiently good and the instrument should be carefully leveled before using.

CALIBRATION

20 In all tests made under the Power Test Codes, the electrical instruments for measuring voltage, current, power, and energy shall be calibrated before and after the test with as little lapse of time as feasible between the calibrations and the test. Calibrations shall be made with (*a*) secondary standards which have been certified by the Bureau of Standards, or (*b*) with standardized instruments which have been calibrated with such standards and which are used for standardizing purposes only.

Tests of Non-Metallic Gears

Progress Report No. 13 of the A.S.M.E. Special Research Committee on Strength of Gear Teeth[1]

THIS progress report gives the results of a series of tests on non-metallic gears recently made on the Lewis gear-testing machine at the Massachusetts Institute of Technology as part of the investigational program of the A.S.M.E. Special Research Committee on the Strength of Gear Teeth. It is a continuation of the Committee's series of Progress Reports (Nos. 4–12) which have appeared regularly in MECHANICAL ENGINEERING.

In these tests as it was not possible to maintain an electric circuit through such materials, no tests were possible which would give a measure of the separation of the teeth when running under load. As a result, this series of tests was made by loading the teeth until they actually broke under the load. The following report is primarily an abstract of the thesis submitted by Frank A. Thas to the Massachusetts Institute of Technology in May, 1928.

Three types of materials were tested: an asbestos-graphite material and two makes of phenolic laminated materials. Sixty-tooth pinions of 10-D.P., 14$^1/_2$-deg. form were made of these materials and meshed with a cast-iron gear of 160 teeth. Six pinions of each type of material were tested. The following table lists the essential details of these gears:

Run	Pinion	Material	Measured error
CD	10-60-4	Phenolic laminated	0.0016 in.
CE	10-60-3	Phenolic laminated	0.0009 in.
CF	10-60-8	Asbestos-graphite	0.0020 in.

Each test pinion was marked with a serial number from 1 to 6 for identification. After the teeth were broken in the running test, static breaking tests were made on some of the remaining teeth which appeared to be undamaged. Table 1 gives the results of these tests.

The results of these tests are also plotted in Figs. 1–3. The smooth curves were established by using the A.G.M.A. equation for the velocity factor and the static-load values given on the diagrams.

With metal gears the stresses set up when the teeth have been deformed an amount equal to the normal errors present are usually so close to their elastic limit that it is not safe to allow very much for the support that may be given by more than one tooth.

[1] The personnel of the A.S.M.E. Special Research Committee on the Strength of Gear Teeth is as follows:
Wilfred Lewis, *Chairman*, President, Tabor Manufacturing Company, 6225 Tacony Street, Philadelphia, Pa.
Carl G. Barth, 420 Whitney Avenue, New Haven, Conn.
Earle Buckingham, Professor, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.
Ralph E. Flanders, Manager, Jones & Lamson Machine Company, Springfield, Vt.
Arthur M. Greene, Jr., Dean, School of Engineering, Princeton University, Princeton, N. J.
Clarence W. Ham, Professor of Machine Design, University of Illinois, 115 Transportation Building, Urbana, Ill.
Charles H. Logue, *Secretary*, Consulting Engineer, 123 Clarke Street, Syracuse, N. Y.
Fred E. McMullen, Manager Cutter Department, The Gleason Works, Rochester, N. Y.
Edward W. Miller, Chief Engineer, Fellows Gear Shaper Company, Springfield, Vt.
Ernest Wildhaber, 379 Alexander Street, Rochester, N. Y.

TABLE 1 TESTS OF NON-METALLIC GEARS

Run No.	Pinion serial number	Pitch-line velocity, ft. per min.	Tooth load
RUN CD—PHENOLIC LAMINATED MATERIAL—PINION 10-60-4			
CD-1	1	198	1860
CD-2	2	393	1510
CD-3	3	809	1441
CD-4	4	1100	1364
CD-5	1	Static	940 (single tooth)
CD-6	2	Static	900 (single tooth)
CD-7	5	1649	1265
CD-8	6	2482	1075
RUN CE—PHENOLIC LAMINATED MATERIAL—PINION 10-60-3			
CE-1	1	201	2130
CE-2	2	405	2250
CE-3	3	738	2160
CE-4	4	1100	1886
CE-5	5	1461	1880
CE-6	6	2435	1600
CE-7	4	Static	1350 (single tooth)
CE-8	5	Static	1503 (single tooth)
RUN CF—ASBESTOS-GRAPHITE—PINION 10-60-8			
CF-1	1	209	1475
CF-2	1	Static	2800 (full mesh)
CF-3	2	628	722 (critical speed)
CF-4	3	1131	981
CF-5	4	1675	747
CF-6	5	720	1043
CF-7	6	452	1200
CF-8	6	Static	2553 (full mesh)
CF-9	2	Static	2694 (full mesh)
CF-10	5	Static	725 (single tooth)

Professor Marx, in his tests on cast-iron gears, found that some increase in ultimate strength resulted from an increase in the duration of contact. He therefore introduced a contact factor which is as follows for $14^1/_2$-deg. gears:

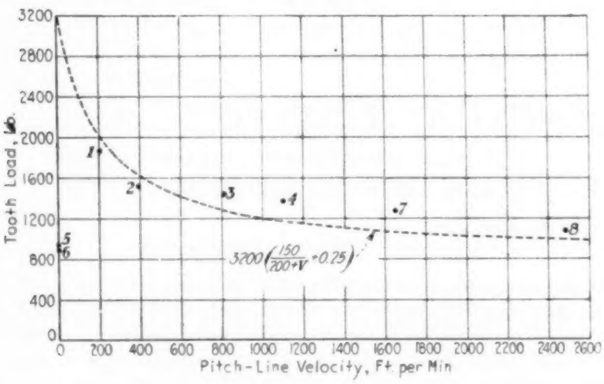

FIG. 1 TESTS OF NON-METALLIC GEARS—RUN CD

Teeth in engaging gears		Duration of contact	Contact factor	Contact factor divided by duration of contact
30	30	1.946	1.47	0.755
30	60	2.066	1.60	0.774
30	100	2.135	1.60	0.749

In this case the contact factor appears to be a direct function of the theoretical duration of contact.

In the case of these non-metallic pinions we have

Teeth in engaging gears		Duration of contact	Contact factor	Contact factor divided by duration of contact
60	160	2.304	3.50	1.52

With these non-metallic gears the stresses set up when the teeth have been deformed an amount equal to the normal errors are but a relatively small percentage of their elastic limit so that the load is distributed over several teeth, the number depending upon the size of the gears or the duration of contact. An examination of these gears after testing showed evidence that the first three or four teeth in the fractured section broke cleanly at the roots, while the succeeding fractured teeth were chewed off rather than breaking cleanly. It would appear from these tests that a contact factor could be safely included in the Lewis formula for the strength of these teeth. It would seem logical to make such a contact factor dependent upon the duration of contact. It is hoped that further tests on these materials can be made in the near future to obtain experimental values for the relationship between the duration of contact and this contact factor. In the

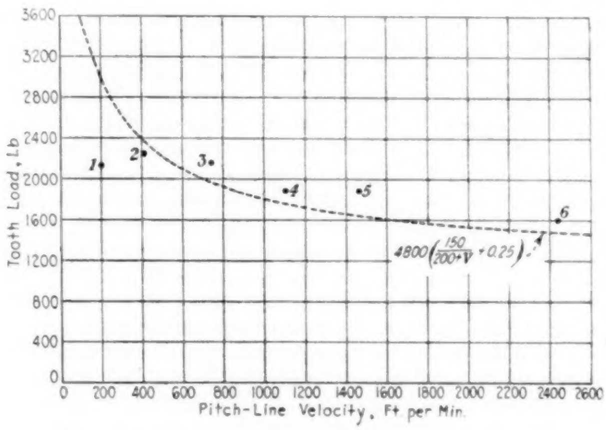

FIG. 2 TESTS OF NON-METALLIC GEARS—RUN CE

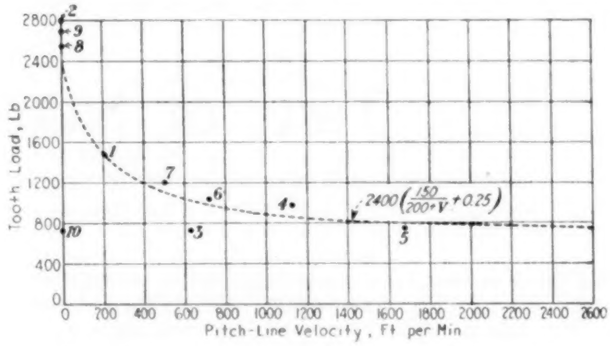

FIG. 3 TESTS OF NON-METALLIC GEARS—RUN CF

meanwhile it would seem that the empirical value of this contact factor could be taken as the $^3/_2$ power of the duration of contact. Thus when

- W = safe working load, lb.
- S = safe working stress, lb. per sq. in.
- p = circular pitch, in.
- f = width of face, in.
- y = tooth form factor, and
- C = contact factor

$$W = SpfyC \qquad [1]$$

And when D = duration of contact in tooth intervals,

$$C = D^{3/2} \qquad [2]$$

The curve in Fig. 4 gives this relationship between the contact factor and the duration of contact.

The test results indicate that the present A.G.M.A. equation for the velocity factor for these non-metallic materials is reasonably reliable. This equation is as follows:

$$S = S_s\left(\frac{150}{200 + V} + 0.25\right) \qquad [3]$$

where S = safe working stress, lb. per sq. in.
S_s = safe static stress, lb. per sq. in.
V = pitch line velocity, ft. per min.

The value of S_s for the asbestos-graphite material would be taken as 4500 lb. per sq. in., and that for the phenolic laminated material as 6000 lb. per sq. in.

A few of the test runs require a little explanation. Since the last tests were reported, the driving unit of the Lewis gear-testing machine has been changed from a variable-speed direct-current motor to a constant-speed alternating-current motor with a Reeves variable-speed drive. In all runs at the lowest speed the

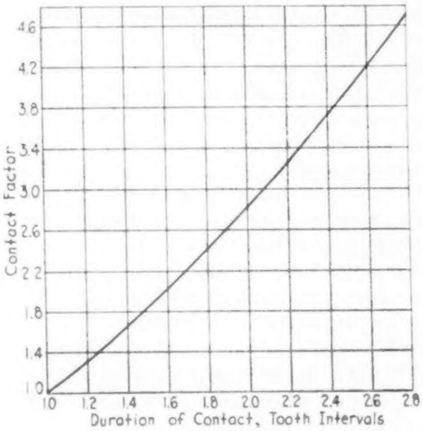

FIG. 4 RELATION BETWEEN CONTACT FACTOR AND DURATION OF CONTACT

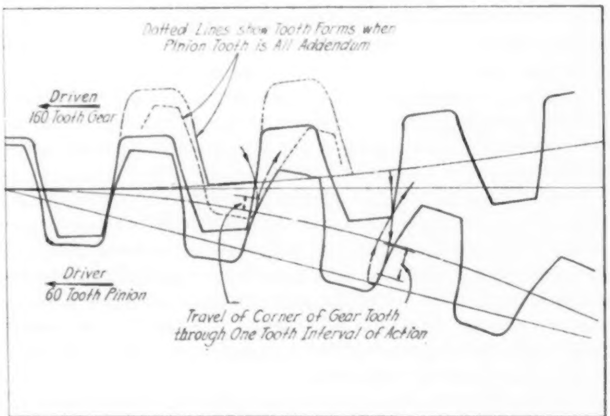

FIG. 5 DRAWING SHOWING APPROACH ACTION OF GEARS TESTED

starting load is relatively severe because of the quick pick-up of the motor, and on all of these runs the pinions broke during acceleration and before the machine had reached its speed. This includes runs CD-1, CE-1, and CF-1. The test loads here are therefore probably lower than they would otherwise be. For test runs at the higher speeds the machine was started at the lowest speed, and the speed was then increased slowly by means of the Reeves drive so as to reduce this starting load as much as possible. In two or three runs at the higher speeds, the teeth broke during this starting. In these cases the test load was taken as the previous load carried without breaking.

The test load on run CF-3 is much lower than should be expected from the results of the other test runs. This run was inadvertently made near the critical speed of the machine with the 3-D.P. master gears. Therefore runs CF-6 and CF-7 were made later on either side of this critical speed to check the results.

WEAR ON NON-METALLIC GEARS

None of these non-metallic gears showed any signs of distress, or compressive fatigue, after test. A scuffing or cutting on the addendum of the non-metallic pinions became apparent, however, under relatively light loads, and increased rapidly as the loads were increased. This was due to the cutting action of the tip of the tooth of the mating cast-iron gear as it entered into contact. Fig. 5 shows the approach action of these gears. The dot-and-dash line at the right shows the path of the corner of the entering tooth of the metal gear. It will be noted that for a considerable portion of one-tooth interval of action this corner travels very closely to the profile of the pinion tooth, so that a slight displacement will cause cutting. This seems to be the explanation of why gear teeth tend to wear into a form of double curvature.

In order to minimize this cutting on non-metallic gear teeth, the addendum of the driving member could be increased with a corresponding decrease in the addendum of the driven gear. The dot-and-dash line at the left shows the path of the travel of the corner of the gear tooth when the tooth form of the non-metallic driving pinion is all-addendum. In this case considerably more deformation of the teeth in mesh would be required before any appreciable cutting could take place. For this reason it would seem advisable to make the addendum of non-metallic driving pinions as much greater than the conventional standard as other conditions will permit, up to a maximum of all-addendum.

Heavy-Oil Engine Fuels

THE suitability of various available oils for present-day internal-combustion engines and the relation of this to laboratory analyses was discussed by H. Moore. Special requirements of the heavy-oil engine impose extra limitations on the character of the fuel. In general, the higher the compression the less exacting its requirement as to the chemical nature of the fuel.

The influence of the ash depends to some extent on its chemical nature. A limit of 0.05 per cent is usually specified, but if the ash is of a non-abrasive nature, as sodium compounds, this figure may be exceeded.

There is comparatively little variation in the heat value of petroleum oils. The coal-tar oils, which vary greatly according to the mother coal, differ from petroleum oils in containing oxygenated bodies such as cresols and have consequently low calorific values. The same applies to the vegetable oils.

The completeness of the combustion in the cylinder can be considered only in relation to engine design. Assuming easy ignition, then clean combustion depends primarily on the timing and adjustment of the fuel valve to the viscosity of the oil and to a less extent depends on the chemical nature of the oil, particularly on the content of hard asphalt, that is, the component which is insoluble in petroleum ether. To the presence of this hard asphalt is usually attributed carbon formation in the cylinders and smoky exhaust. However, where such oil is used it was the author's experience that large low-speed two-stroke-cycle engines give the better results. Hard asphalt is absent from distilled oils, and partly on this account they are preferred.

There appears to be no direct relation between sulphur content of an oil and its behavior in an engine, except so far as the sulphur may be a component of the hard asphalt. Apart from silencer corrosion, the presence of sulphur seems to have no deleterious effect.—H. W. Brooks in report of the London Fuel Conference in *Power*, October 30, 1928, p. 724.

SURVEY OF ENGINEERING PROGRESS

A Review of Attainment in Mechanical Engineering and Related Fields

AERONAUTICS

"The Motorcycle of the Air"

THIS name has been chosen to designate a plane that would sell in England for, say, £300 ($1500) and would yet be suitable for a reasonable amount of flying. The editor of *Flight* has now been informed by a correspondent who has in the past produced a considerable number of successful machines that he has now completely designed a machine that would apparently satisfy the above specification. It is to be a small, all-enclosed monoplane, single seater, designed for the A.B.C. Scorpion Mark II engine. The wing span is 25 ft. 8 in. and the overall length 16 ft. 7 in. As the wing is arranged to fold, the width for housing purposes is only 7 ft. 6 in. The designed tare weight of the machine is 425 lb. and the gross weight 700 lb. The calculated top speed is 105 m.p.h. and the landing speed 40 m.p.h. At a cruising speed of 85 m.p.h. the estimated range in still air is 340 miles for a total gasoline consumption for that distance of 8 gal., or more than 40 miles per gallon. Allowance has been made for 20 lb. of baggage. It is stated that for an additional weight of 150 lb. the range can be extended to 1000 miles with very little sacrifice in performance. (Editorial in *Flight*, vol. 20, no. 37/1029, Sept. 13, 1928, pp. 772, *g*)

Control of Aircraft by Supplementary Aviettes or Alulas

THE wings of most flying birds are provided with a small or well-defined auxiliary wing variously known as the "alula" or bastard wing, situated above the front leading edge at the outer joint. The wings are also provided with a small pinion known as the "remicle," situated at the front edge of the wing but at a greater distance from the body. The bastard wing is formed on the first digit and the remicle is attached to the tip of the second digit. As all birds having highly developed flying powers are provided with bastard wings, it would appear that this wing and the remicle are not relics of obsolete members but are performing some important function.

A number of experiments were made before the war with airplanes having small planes or aviettes of various chords placed in various positions with respect to the main plane, and it was found that these additional planes or alulas could be used for controlling aircraft. In the present case small wings have been mounted in front of or above the leading edges of the main wings so as to form a gap between them at the main wings, and means for controlling the inclination and projection of these wings are provided, as well as means for balancing them. The author describes and illustrates in some detail the arrangement of these aviettes and the sum of the results obtained thereby. (A. P. Thurston, D.Sc., in a paper before the British Association, Glasgow, Sept. 11, 1928; abstracted through *Flight*, vol. 20, no. 37/1029, Sept. 13, 1928, pp. 782–785, 13 figs., *d*)

ENGINEERING MATERIALS (See also Machine Shop: Tungsten Carbide as a Tool Material)

Slag, Coke Breeze, and Clinker as Aggregates

THE original article gives definitions of terms and describes factors which affect the suitability of the materials for various uses, as well as methods of their utilization, and presents some critical data on the compression strengths of concretes containing slag, coke breeze, and clinker.

The properties of slags, breezes, and clinker as aggregates are such that each of these will make a concrete which is satisfactory for certain purposes, provided that due regard be paid to the nature of the concrete and to the particular purpose for which it is to be employed. In all cases, however, a careful selection of the material is of the greatest importance, and this cannot be too strongly emphasized.

Slag will make a sound and strong concrete provided that the slag is neither very acid nor strongly basic. It is often better to use only the coarse slag and reject the fines, using sand instead. This not only yields a stronger product but also obviates possible danger due to the activity of these fines.

Coke-breeze concrete is usually rather weak mechanically and is unsuited for use in outside or wet situations, but it has the very important advantage of yielding a light product which can be used for internal walls. The breeze which is selected with proper care, paying due regard to the precautions which have been suggested, is a useful material for such purpose. Coke breeze may also be usefully employed together with sand as a fine aggregate.

Clinker yields a denser concrete than breeze and of greater strength. It appears, however, that the possible sources of trouble with this material are rather greater than with coke breeze or slag, owing to its even greater lack of uniformity. Unburnt coal may be a particular source of danger in clinker concrete.

Clinker, in association with lime, forms a very serviceable aggregate for mortar and plaster, provided that the necessary precautions are taken, and for this purpose its pozzolanic properties may render it superior to sand.

Present knowledge of the effect of sulphur compounds present in aggregates on the resulting concrete is indefinite and does not permit of any exact limits being suggested to the composition of the materials. It has only been possible to suggest figures which would appear to be safe from such evidence as is available at present. In any case, the influence of the various compounds must always be very much affected by factors such as the porosity of the concrete and its situation.

A bibliography of the subject is appended. (*Department of Scientific and Industrial Research*, Building Research Special Report no. 10, 1927, 22 pp., *ep*)

FOUNDRY

Casting Pipe Centrifugally in Green-Sand Molds

DESCRIPTION of a process developed by two Italian engineers, Possenti and Scorza, a modification of the process developed in America by W. D. Moore. This process is used at the foundry of the Montecatini Co., at Pesaro, and the Necchi Foundry at Pavia, Italy.

In the plant at Pesaro a compressed-air molding machine is used, upon which one to four flasks are placed to form the molds. This compressed-air machine is of the type made by the Tabor Manufacturing Co. in Philadelphia. The mold is skin dried and the flask with the mold is placed in the centrifugal casting machine. The metal is poured while the machine is being rotated

at the proper number of revolutions. When the casting is finished the flask is removed from the machine and the pipe withdrawn from the flask. The pipe, which is still a cherry red, is allowed to cool slowly on the cooling platform with some sand still adhering. The sand subsequently falls off due to the layer of special blacking used in the mold.

An important feature of the method is the runner through which the metal is poured. This has been devised to supply metal almost instantaneously throughout the length of the mold. Pouring of the metal for a pipe 10 in. in diameter and 13 ft. long will require approximately 10 to 15 sec., depending on the temperature of the molten metal. The feed runner also is designed to filter the metal, thereby retaining the major part of the slag which will be present, even in a carefully cleaned ladle. Filtration of the metal gives a clean surface inside.

Particular emphasis is given to the temperature and fluidity of the metal because it is upon these factors that the uniformity of the thickness throughout the length of the pipe will depend, even if the pipe is thin. It has been the intention to devise not only a runner capable of withstanding a large number of pouring operations, but also one from which all slag may be removed quickly after casting.

In this case the machine is rotated at a greater speed than machines with permanent molds, which is necessary as the metal remains for a longer period in the physically pasty state due to the slower cooling. An important factor is the temperature of the metal when being poured into the revolving mold. Micrographs in the original article show the structure of the metal. (Giuseppe Guerrini in *The Foundry*, vol. 56, no. 20, Oct. 15, 1928, pp. 832–835, 21 figs., *d*)

FUELS AND FIRING

Engine Knock and Anti-Knock

THE following is an abstract of a part of a review of the progress of naphthology during 1927, and contains references to a number of investigations which were made during that time. Part of this study is devoted to a definition of the process of detonation. One of the interesting features of it is that apparently experiments made in a tube do not give reliable information as to what happens in an actual engine, and, for example, it has been demonstrated that audibility of explosion depends on the dimensions of the containing cylinder as one of the factors.

A flame possesses ahead of it a narrow zone in which the gases are being heated. The more readily they can ignite the quicker is the flame propagation and the more rapid the rate of rise of pressure. There is evidence that auto-ignition occurs in a region of high pressure well ahead of the flame. Fuel mixtures containing liquid particles have been shown to ignite more readily than completely vaporized mixtures.

When it comes to anti-knocks it is pointed out that tests carried out with different engines may give different results, depending on the temperature and other factors relating to the engine and on the nature of the fuel to which the anti-knock is added.

In particular, it has been shown that metal organosols of lead, nickel, iron, etc. show anti-knock properties in relation to their content of metal. Certain bismuth and cadmium compounds (but not nickel in colloidal suspension) were found effective. Vapors of metals appear to have the same affect on the igniting temperatures as organometallic anti-knocks dissolved in gasoline.

An important matter has been shown, namely, that anti-knocks act as inhibitors of oxidation and not as multiple ignition centers. These compounds inhibit oxidation during the compression stroke in the engine. Although the metal atom is mainly influential in the inhibition, the organic groups with which it is in association modify to some extent its behavior, and, for example, lead phenyl is less effective than lead ethyl. A large amount of work is reported on attempts to explain the behavior of anti-knocks by ionization or radiation effects. In this connection it is mentioned that a remarkable increase in ionization was obtained for carbon monoxide-hydrogen-air mixtures in the presence of iron carbonyl, although the iron carbonyl-air mixture alone showed no such effect. On the whole, the evidence is that ionization is an accompaniment of the chemical and thermal processes, and not a determining cause.

As regards radiation, there is no evidence that the effect is other than an accompaniment of the higher temperatures produced. Neither is there any evidence of the absorption of such radiation by the anti-knock's being instrumental in the prevention of activation of the combustible gas ahead of a flame. Many substances absorbing such radiation are much less effective in preventing the spread of flame than those which do not absorb. (A. Egerton, Fellow of the Royal Society, in *Journal of the Institution of Petroleum Technologists*, vol. 14, no. 69, Aug., 1928, pp. 656–667, and 75 references on pp. 667–669, *geA*)

The Negative Catalysis of Auto-Oxidation

IN MODERN chemistry the term "catalysis" is generally used to define the action of certain substances which either accelerate or make possible a reaction between two or more of the substances without, however, entering into the final combination. This has been described as "brokerage" action, the catalysis bringing the other materials together and then eliminating itself. A familiar instance of catalytic action is seen, for example, in the so-called hydrogenation of oils, whereby an oleaginous liquid such as peanut oil is made to acquire additional hydrogen molecules and is thereby converted into a hard fat such as Crisco. Bubbling of hydrogen through the oil will not produce hydrogenation, but if a minute amount of finely divided nickel is present, the reaction will take place and the nickel will not be consumed. In the past, particular attention was directed to matters promoting the reactions. In this case the authors deal with what might be referred to as the inverse phenomenon, viz., catalysts inhibiting the reaction, particularly in connection with the phenomenon of oxidation.

The work was started during the war when considerable amounts of a chemical called "acrolein" had to be produced; this material, however, was extremely unstable and rapidly absorbed oxygen, which transformed it into another material called "disacryl" and entirely useless for the desired purpose. Experimentally, it was found that the addition of very small amounts of phenols such as one part of hydroquinone to 10,000 parts of acrolein prevented auto-oxidation and produced a stable condition in the acrolein. This led to a study of the whole subject of inverse catalysis with respect to auto-oxidation. Among other things, the investigation threw considerable light on the problem of anti-knock in internal-combustion engines.

All previous theories assumed that anti-detonant action takes place in the gaseous phase. The authors point out, however, that the fuels which are most prone to knocking are the least volatile, and conclude from this that the action of the anti-detonants takes place in the liquid phase and that in consequence knocking originates in this phase, especially in the case of highly volatile fuels. They believe that anti-detonants hinder the formation of peroxide by an anti-oxygenic action similar to that observed in other cases of inhibition of auto-oxidation. This is important because the sudden rise in pressure which is produced by knocking finds its explanation in the explosion of the peroxides.

The authors also show that substances with anti-detonating properties possess anti-oxygenic activity in hot auto-oxidation. All the experiments carried out by the present authors on the auto-oxidation of heated substances show that the same catalyst

may vary in its action toward different auto-oxidizable substances. This shows the importance of the changes which take place prior to the actual combustion of the fuel in the cylinder of a motor. In this connection they made following practical suggestions:

1 The variability of the activity of the same catalyst in the auto-oxidation of different fuels leads to the belief that the same variability must exist when it is used as an anti-detonant with different liquid fuels. The same catalyst may be very effective for one fuel and almost inert, or even pro-detonant, toward another. Small variations of the conditions may lead to the inversion of the action of the catalyst (e.g., the case of mercury diethyl). Valuable informatlon could be obtained by determining the most suitable anti-detonant for every fuel by laboratory experiments.

2 Since considerable oxidation of the fuel prior to combustion impairs the energy yield in the motor, it is essential to determine a new constant of fuels—auto-oxidizability in the liquid phase. It may be pointed out that this alone will not give a measure of the tendency to knock. Thus, while an auto-oxidizable fuel may tend to knock, all fuels of this class may not do so. The accumulation of peroxide is a necessary stage in knocking (see above), and the latter will not take place if these substances rapidly decompose into stable conbustion products. Then the result will be a loss of energy by partial combustion of the fuel at the wrong time. Among the fuels which do not tend to knock, most will show small auto-oxidation, and knowledge of the constant of auto-oxidizability will permit a choice between them.

3 The use of anti-detonants does not appear to us to be limited to avoiding knocking; previous considerations lead us to think that they might be used in all cases in which loss of energy is involved by early oxidation of the fuel.

4 Since experiments by the present authors show that certain aliphatic oils undergo auto-oxidation in motors, anti-oxygens might be used to limit this auto-oxidation at high temperatures. (Messel Memorial Contribution by Charles Moureu, Professor, Collège de France, and Charles Dufraisse, Professor, School of Physics and Industrial Chemistry. From *Chemistry and Industry*, vol. 47, nos. 32 and 33, August 10 and 17, 1928, pp. 819–828 and 848–854)

INTERNAL-COMBUSTION ENGINEERING (See also Fuels and Firing: Engine Knock and Anti-Knock; Negative Catalysis of Auto-Oxidation; Marine Engineering: Light-Weight Diesel Engines; The Italian Motor Liner "Augustus")

The Airel Diesel Engine

THIS engine is said to have been tested in France as a single-cylinder experimental unit and has shown remarkable results. Its main feature is that water is injected into the cylinder at a certain part of the cycle, and that this injection of water is specially controlled. As would appear from the diagram in the original article, there is a rise in temperature up to 600 deg. cent. (112 deg. fahr.) due to compression of supercharged air. The crank is then at its top dead center and fuel injection commences; the consequent combustion immediately causes a rapid rise in temperature to about 1250 deg. cent. (2282 deg. fahr.); water is then injected and combustion becomes particularly isothermal at slightly over 1200 deg. cent. (2192 deg. fahr.), coming down to 200 deg. cent. (392 deg. fahr.) on the expansion stroke, which represents the point at which the exhaust valve opens.

The complete operating cycle of the Airel engine may be briefly described as follows: When the piston on its up stroke has covered the exhaust ports, the air valve is opened and the compressor forces into the cylinder a greater quantity of air than would be admitted under atmospheric pressure alone. This is compressed by the ascending piston so that its temperature is raised sufficiently to ignite the fuel that is forced through the atomizing nozzle into the cylinder at a pressure of 275 lb. Just before the piston reaches the top dead center the temperature tends to rise, but a regulated quantity of water is then injected with the fuel at the same pressure through the nozzle and combines with the fuel without interrupting combustion, though maintaining the temperature within the favorable zone as already stated and increasing the pressure. The fuel is then cut off, but a small quantity of water continues to be injected, and this not only cleanses the injection channel, preventing formation of carbon deposits therein, but, being converted into steam, expands and expels the burnt gases through the exhaust ports. The cylinder is then filled with practically dry steam, which, acting as a catalytic agent on the succeeding compression stroke, accelerates combustion at the moment of ignition.

No complete data of tests are reported. (*Motor Transport*, vol. 47, no. 1229, Oct. 1, 1928, pp. 389–390, 4 figs., *d*)

MACHINE PARTS AND DESIGN

The Schwartzkopff-Huwiler Variable Hydraulic Gear

IN THIS gear oil is used as the working fluid, the gear consisting essentially of two parts, a driven primary unit or a pump and a secondary unit or motor, the pump being the driven part of the gear and the motor the driver which transmits the drive to a machine or other mechanism. It is said that this gear can be used for the automatic regulation of stroke as well as of speed. The gear is built in sizes from 12 to about 200 hp. It was tested at the Technical High School in Dresden and is said to have given satisfactory results. The details of construction and some of the details of tests are reported in the original article. (*Engineering*, vol. 126, no. 3268, Aug. 31, 1928, pp. 255–257, 12 figs., *d*)

MACHINE SHOP

Tungsten Carbide as a Tool Material

IT has long been known that tungsten carbide is a hard material. Alone, however, it is too weak and porous for most industrial applications and needs some strengthening material, but this must not be such as to reduce its hardness too much.

German investigators have been particularly active in this field and have developed the so-called "Hartmetall" (Osram Co.) which is a combination of tungsten carbide and cobalt. Various forms of carbide tool materials have been studied by the General Electric Co. in its research laboratory and in its shops, and it is the experience thus gained which is described in the paper here under consideration.

The density of this material runs 14 grams per cu. cm. and above, depending on the amount of cobalt used. This characterizes it as a heavy metal, almost of the tungsten class. It does not tarnish and, when ground, resembles metals of the steel class in appearance. It resists chemical attack remarkably well, and is a pleasing and satisfactory material for use in the arts.

Its hardness can be given in a number of ways. Sapphire is the mineral which comes next below the diamond in hardness. This material is capable of producing a well-defined scratch on the natural sapphire. When it is borne in mind that the sapphire has an "absolute hardness" of 1150 kg. per sq. mm., and that a mineral which is as hard as feldspar has an "absolute hardness" of 300, the hardness of this new material receives new significance.

The author describes in some detail the method used in testing the hardness of this material as well as the tensile-strength

tests. The German material was found to run around 225,000 lb. per sq. in., and the American from 250,000 to 275,000 lb. per sq. in. Pure carbide would probably come under 50,000 lb. per sq. in.

Use as a Tool Material. Glass proved to be quite easy to machine or to cut with screw threads, and it was found that hard porcelain insulators could be machined on a shaper. Hadfield manganese steel was found to yield so easily to this new tool material that it would seem that the operation could be developed commercially. At one time an attempt was made to machine a block of quenched high-speed steel on the shaper, and it proved to be possible to take a cut though the edge crumbled. The same was found to be the case in several attempts to machine alloys of the cobalt-chromium type. In a number of other cases it was found that materials which could not be usefully machined previously were cut either quite easily or without too much grief by this new material. Such were hard carbon, genelite (a copper-tin-carbon composition), commutators of electric motors composed of alternate layers of copper and mica, bakelite, and the like.

The machining of cast iron by carbide tools offers a variety of problems, so that it will be well to consider the subject from several different points of view.

One of the most difficult jobs to do on cast iron with the usual tools is that of removing the surface layer, particularly if the surface contains sand. This is due to the fact that the chilled iron and sand are harder than the tool used to cut them. As has been pointed out, this material is harder than sand and chilled iron, so that castings which would take the edge off high-speed steel almost at once can be handled with but little difficulty. In fact, about the same speeds and feeds were used on these cuts that are used on the sub-surface cuts. Even cuts which travel in and out of the surface layer cause no particular trouble, and such cuts are recognized as being the most abrasive on the tool.

A somewhat similar problem is presented by "hard" castings. If a machine shop is accustomed to machining castings of some particular grade, a run of castings which is apparently harder is certain to increase the machining costs whether the increase be due to annealing, to a lower production rate, or to scrapped castings and lost time. These castings may be, and quite likely are, of a better grade than the softer castings with which the shop is accustomed to deal. From that point of view it is unfortunate that they cannot be satisfactorily and economically handled. Tungsten carbide tools machine these "hard" castings with ease, and it has been found that a run of such castings will go through the machine shop without disturbing the practice in any way.

The matter of using this material as a finishing tool on cast iron will require a special study.

The author next discusses the question of using this material to cut steel. Here again it would seem that the use of this material has increased the cutting ability of tools by a whole order of magnitude. This is the first time this has been done since the introduction of high-speed steel by Taylor and White. The material is put out and under the trade name of "Carboloy." (S. L. Hoyt, Research Laboratories, General Electric Co., Schenectady, N. Y., in a paper presented at the 10th annual convention of the *American Society for Steel Treating*, Philadelphia, Oct. 8–12, 1928, 15 pp., *deA*)

Trepanning Operations

TREPANNING, which means cutting a circular grove, is a machining operation which does not receive the consideration it deserves, notwithstanding the fact that by its use in the production of small rings and disks a great saving in time can often be obtained. Where larger work is concerned, not only time but also power and material are saved. Where large quantities of rings are required this form of tool cannot compete with the ordinary power press, but press tools are expensive and the

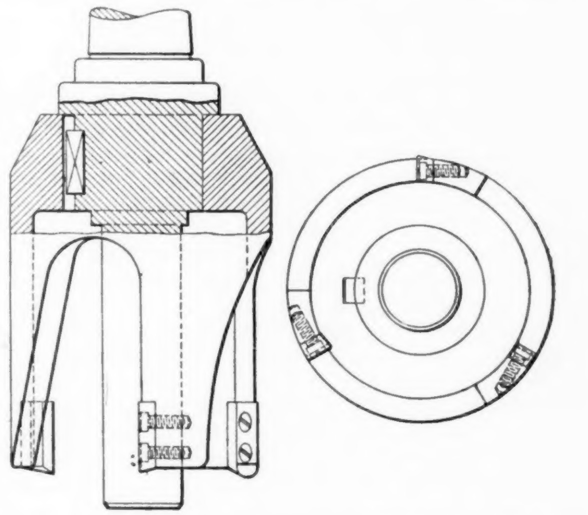

Fig. 1 Trepanning Tool Suitable for 7-In-Diameter Holes in 5-In-Thick Steel

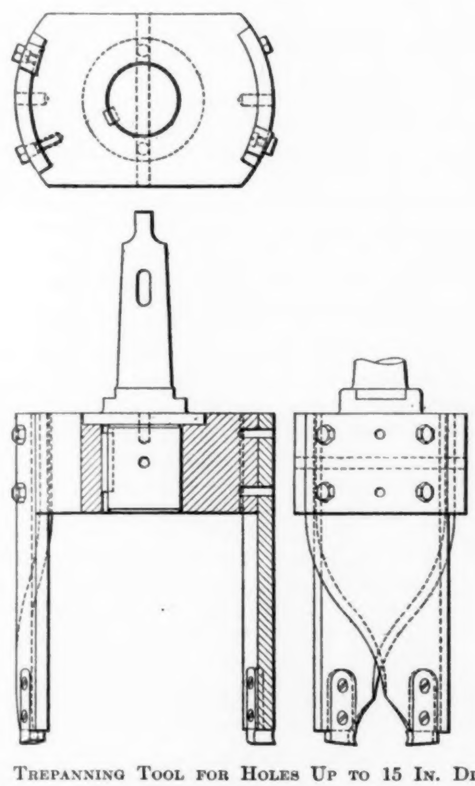

Fig. 2 Trepanning Tool for Holes Up to 15 In. Diameter

right size may not always be available for small and medium numbers.

The original article describes several trepanning tools; for example, a tool used for producing certain washers. By means of the same tool a number of concentric rings can be produced at one setting. Another tool illustrated in the original article can be used on a turret lathe or vertical boring machine and gives

quite satisfactory results without a pilot, provided the component is not too thick. Fig 1 shows a type of trepanning tool which is designed for larger diameters than that previously described, and is capable of cutting through much thicker material. It carries three cutting tools, and is suitable for holes up to 7 in. in diameter in 5-in.-thick forged steel. Where used for heavier jobs it is only necessary for the operator to reverse, as the 2-in. pilot hole is capable of pulling the hole true enough for a bar and double cutting to finish the bore to the required dimension. The design is simple and easy to make, and very suitable for top ends of connecting rods of air compressors or small Diesel engines.

The arrangement shown at Fig. 2 is designed on similar lines without a pilot for much larger work, such as crank webs, and will give satisfaction up to 15 in. diameter. It carries only two cutting tools, each of which cuts internally and externally with $^1/_8$-in. overlap in the center, giving a total width of cut about $1^1/_4$ in. It makes for a great saving in time and material.

The two previous designs, although capable of being used horizontally, give much better results when used vertically, as the large cuttings are then better able to clear themselves, saving the operator the necessity of continually easing the feed, on account of springing, and stopping the machine to clear away the cuttings. [J. W. in *Machinery* (London), vol. 32, no. 833, Sept. 27, 1928, pp. 857–859, 9 figs., *dp*]

MACHINE TOOLS

The Butler 60-In. Draw-Cut Traveling-Head Shaper

THIS machine is of interest because it is equipped with boring, milling, and drilling motions and is intended to be used where large and bulky castings have to be machined. It is intended to operate by shaping on 60 in. of length, 5 ft. of height, and 9 ft. of length, and can do milling, boring, and drilling within these dimensions. It may be carried to the job—the underside of the cross-bed being planed to attach to any works floor plate. It is said to require comparatively little floor space and very small power to operate, the whole of the power being used for cutting and not for moving the work. The shaping head may either push-cut or draw-cut in accordance with the circumstances and the job. The great advantage of the draw cut is that the ram is in tension when cutting, thereby eliminating vibration. The heavier the cut, the less tendency to vibrate. Furthermore the operator can shape to lines which are naturally on the outside of the piece where the draw cut begins. This is a big advantage where large castings have to be machined to marks. The steel shaping bar is 10 in. square, which gives a rigidity not only of value for its chief use, but particularly important when milling with a long overreach.

The milling and boring motions are driven from a separate vertical shaft from the main motor with hydro gearing, and a special three-speed box is carried on the end of the square shaping bar. By means of this gear box with the variation of speed of the main motor, a continuous range of speeds is available. Quite a list of additional equipment for such purposes as machining locomotive cylinders is provided. (*British Machine Tool Engineering*, vol. 5, no. 53, Sept.-Oct., 1928, pp. 116–121, 8 figs., *d*)

MARINE ENGINEERING

Light-Weight Diesel Engines

A DEPARTURE from conventional practice in the construction of light-weight Diesel engines built for moderate-sized yachts is the complete elimination of cast iron. The frame is made of aluminum, except where salt water is circulated. The cylinder heads, cylinder liners, and water jackets are of special ferrous metal which has the strength of cast steel and resists the action of sea water. To reduce inertia forces to a minimum aluminum-alloy pistons and drop-forged connecting rods made of vanadium steel are employed. The main bearings and connecting-rod crank bearings are fitted with flanged steel shells lined with Post Motor-marine bearing metal centrifugally poured and securely bonded to the shells. (*Motorship*, vol. 13, no. 10, Oct., 1928, pp. 842–843, 1 fig., *d*)

The Italian Motor Liner "Augustus"

THIS is supposed to be the largest motor liner in service. It is driven by a six-cylinder engine with cylinders of exactly the same size as those built in America for the Shipping Board vessels *Seminole* and *Wilcox*, except that the Italian liner's engines run at a somewhat higher speed. The main engines have been designed to burn both boiler oil and Diesel oil, but are operated for the present on Diesel oil only.

All the auxiliary engines have undergone a considerable change from their initial design. They have been converted to airless injection, though the compressors are still hooked up to the engines. In port their fuel valves are all taken out and cleaned, but at sea they are kept continuously in operation just as if they were still operating with air injection. Carbon forms at the valve nozzles, but not excessively, and is easily cleaned off. Should airless injection be installed on the main engines it would effect a saving of probably some 3000 hp., with a consequent reduction of about 10 tons daily in the fuel consumption. (*Motorship*, vol. 13, no. 10, Oct., 1928, pp. 833–837, illustrated, *d*)

Fast Cargo Liners

IN KIPLING'S poem, "Mary Gloster," the dying ship owner, Sir Anthony, tells his son,

> It paid, my son, it paid
> When we came with the nine-knot freighters
> And captured the long-distance trade.

The nine-and ten-knot freighter was standard for a long time, in fact as long as the reciprocating steam engine remained the sole propelling means on the high seas. The introduction of the steam turbine has permitted raising the speed somewhat, but not much, because of the unsatisfactory ratio between the best efficiency of the turbine and that of the propeller.

The September, 1928, issue of *The British Motor Ship* contains several editorials and articles dealing with the most recent development in shipping, and that is, the 13- to 16-knot cargo liners.

The approaching completion of what appears to be the first cargo liner designed specifically to maintain a speed of over 16 knots is an event of real importance both to ship owners and to shipbuilders. In favorable circumstances cargo ships have occasionally attained 16 knots for short periods, but the *Sud Americano* will be the first of six cargo liners specially designed to operate at that speed regularly. All of these six ships will be built for the Prince Line and will operate between New York and the River Plate to carry a large amount of refrigerated cargo.

There is reason to believe that the 16-knot ship has a future upon other routes. A 10,000-ton motor vessel of that kind would have an average yearly fuel expenditure of some £12,000 (about $60,000) more than a 14-knot ship, reckoning the cost of oil at £3 per ton. The other additional charges would bring the yearly expenditure of the 16-knot ship up to £20,000 or £25,000 ($100,000 to $120,000) above that of the 14-knot vessel. The advantage lies not only in the fact that the fast ship will cover 1200 miles more then the slower vessel with consequent increase in earnings, but that she will attract cargo by virtue of her higher speed. One of the directors of the Eller-

man Line recently stated that he did not consider that the maximum speed for cargo liners had been reached in $14^1/_2$-knot vessels. (Editorial on p. 204 of *The British Motor Ship.*)

So much interest has been centered upon the 13- to 16-knot cargo ships which are now being built, and the fact has been so strongly emphasized that the majority of these ships are motor vessels, that the possibilities of the $9^1/_2$- and $10^1/_2$-knot classes of freighter have perhaps been overlooked. Generally speaking, it is quite true that the motor cargo ship shows to greater advantage the longer the voyage and the higher the power; but, with the modern efficient single-screw oil-engined vessels of low power which are now being constructed, it is clear that they can compete very satisfactorily, even with the cheap steamer.

It is therefore a matter of interest that the Court Line, whose fleet of 19 tramp vessels are all steamers, should last month have ordered a motor ship, which is a typical vessel of her class, capable of 10 knots and of carrying about 9000 tons. The Doxford-engined freighters which have been, and are being, built for the Moor Line, carry 8100 tons at a speed of $9^1/_2$ knots on a consumption of $4^3/_4$ tons daily, and when figures such as these are compared even with the best single-screw low-priced tramp steamers, making allowance for their admittedly small capital cost, but bearing in mind the larger cargo capacity of the motor ship and its other advantages, it is not surprising that for certain trades the oil-engined vessel is found to be advantageous. The nine King Line ships and the score of Bank Line vessels, also 10-knot craft, are further examples of the efficiency of low-speed motor craft, and although the trend today is undoubtedly toward higher speed, there is still need, and presumably always will be, for the cheaply operated ship which does not exceed ten knots in service. (Editorial in *The British Motor Ship*, p. 206.)

Another development brought about by the fast speed is the growing adoption of cargo vessels which are provided with passenger accommodation on a style practically equivalent to that in a first-class liner built purely for the transport of passengers. This movement is best exemplified in the numerous ships that have been constructed for the trade between Europe and Pacific ports in North America.

The Furness, Withy vessels, of which six are in service, have accommodations for twelve passengers only, but this accommodation is quite luxurious. The five Hamburg-Amerika Line ships, on the other hand, not only provide cabins for twenty-four first-class passengers, but for an equal number of third-class. Numerous other cargo liners are operating on the same trade, including several Italian vessels and two or three owned in Sweden or Norway. The speeds range from $13^1/_2$ up to $14^1/_2$ knots.

The movement is, however, spreading in other directions, and the latest Hamburg-Amerika cargo liners for the Far East also have accommodations for over twenty first-class passengers. In the Mediterranean all the new cargo motor vessels are provided with accommodation on a very substantial and luxurious scale, quite unheard of when steamers operated the services in question. The four 500-ft. 15-knot cargo liners building for the Netherland Steamship Co.'s service to the Dutch East Indies represent another example of the same tendency, this being quite a new development, and it is reasonable to suppose that it will progress rapidly. It is a new factor in the shipping situation which must not be ignored by cargo-line owners, and as the majority of these new craft are foreign vessels it is hoped that British ship owners will consider this question in all its phases. (*The British Motor Ship*, vol. 9, no. 102, Sept., 1928, editorial on p. 203. Compare articles on pp. 210–215, illustrated, and pp. 222–223, *gs*)

MATERIALS HANDLING

Pneumatic Coal Conveyors

AT THE plant of the Page Dairy Co., Toledo, Ohio, about 6000 tons of coal is consumed at the boiler plant. In addition to all the other requirements of an installation for handling this coal is the fact that cleanliness is of paramount importance in a dairy plant, and hence any dust from unloading of the coal is particularly objectionable. A fully enclosed pneumatic system of coal handling was selected of a type which, in addition to the matter of cleanliness, also satisfied requirements as to flexibility, convenience in installation, and minimum labor requirements. (Brady Conveyors Corp., 20 W. Jackson Blvd., Chicago, Ill.)

An initial cost of $9000 for the installation was not considered as excessive, as in addition to the other advantages mentioned a saving estimated by the Page management as $1 per ton, through cheaper coal, when buying in carload lots, and less labor, made it possible to pay for the equipment in eighteen months.

The system consists of an 8-in. pipe line, centrifugal separator, and vacuum chamber, an air scrubber to eliminate the dust, and a Root-type blower "Tex"-rope-driven by a 40-hp. motor. Coal is drawn from the car through a flexible wire-inserted rubber hose hung from a swivel joint provided with ball bearings. The hose passes over the end of a boom which can be swung sideways to clear the track when not in use or swung out over the car when it is desired to unload coal. A 6-in. nozzle permits coal of large size to be drawn into the pipe line, where it passes through an overall distance of 170 ft. to the dust-separating plant.

Entering the centrifugal separator tangentially at high velocity the heavier particles of coal whirl around the circumference and settle to the bottom of the receptacle, from which they are delivered to the bunker immediately below by an airtight rotary discharger chain-driven by a 1-hp. motor equipped with a speed reducer. The fine coal dust passes to the center of the separator and is drawn off at the top to an air scrubber provided with water sprays and a layer of filtering material having the added faculty of drying the air before it passes to the vacuum pump or blower and is discharged to the atmosphere. The dust, caught by the water, is washed down to a sludge tank, from which the coal is reclaimed and the waste water drained to the sewer.

Exclusive of overhead and maintenance, sufficient time not having elapsed to know the latter, the operating cost per ton of coal handled is comparatively low. On a capacity basis of 15 tons per hour and the use of 30 kw. per hour, the cost of power at $1^1/_2$ cents per kw-hr. averages 3 cents a ton; labor at 50 cents an hour averages 3.33 cents a ton, making a total, including minor supplies, of approximately 7 cents a ton of coal. Taking the entire overhead, including interest, depreciation, and the other usual items, at 12 per cent, the overhead charge for the year would total $1080, which reduces to 18 cents a ton of coal handled. Adding the fixed charges to the operating cost gives a total figure per ton of 25 cents. (*Power*, vol. 68, no. 14, Oct. 2, 1928, pp. 566–567, 3 figs., *d*)

METALLURGY (See Machine Shop: Tungsten Carbide as a Tool Material)

MOTOR-CAR ENGINEERING

Mechanical Progress in 1929 Cars

THE most interesting developments from a mechanical-engineering point of view deal with the cooling system. The radiator has an important effect on the appearance of the car, and therefore is subject to style changes. From the point of view of a mechanical engineer, the radiator should be of circular form

as in that case every part would be swept by the fan, but fashion dictates that the radiator should be narrow and high. It is not impossible that if the trend continues, two fans, one above the other will be used. In one case the change in radiator styles has led to the discontinuance of the combined pump and fan in order to make it possible to place the fan more advantageously.

The valves for heat control to the carbureter are working under very unfavorable conditions, and it appears that some of them have been giving trouble from corrosion due to the high temperature to which they are exposed. To eliminate this, materials of greater heat resistance are going to be used.

Steering gears have been the problem of automobile engineers during the past few years, partly because of the difficulty of maneuvering a heavy car with balloon tires when parked in a confined space, and partly owing to the tendency toward front-end vibration due to the increase in weight of the front wheels through the addition of brakes. Quite recently two makers, Hupp and Packard, announced that they were providing a new cure for wheel movement by shackling the front spring on the steering-gear side at both ends, cushioning the rear shackle between springs. The theory of this device seems to be that when the left front wheel strikes an obstruction, something must yield, and if the axle on that side is held rigidly in the fore-and-aft direction relative to the frame, the shock is transmitted to the steering wheel through irreversible steering gears. (P. M. Heldt in *Automotive Industries*, vol. 59, no. 14, October 6, 1928, pp. 469–471, *d*)

A Fool-Proof Friction Gear

THIS designation refers to the Robertson variable-speed gear which has been tested recently on a Gwynne car in England. The gear is being developed by the Robertson Automatic Variable Speed Gear Co., Ltd., 30 Duke St., Piccadilly, London, W. I.

The Robertson gear embodies essentially a number of known devices. The face of the flywheel is slightly coned, while the propeller shaft is extended forward and carries a plate or disk which is also slightly coned to match the flywheel cone. The front end of the propeller shaft can be moved up and down by a suitable control, and the disk or hollow cone which it carries has just inside it on its edge a strip or ring of friction material. When the hollow cone fits exactly on the flywheel cone it resembles a cone clutch, and the propeller shaft is in line with the flywheel center or crankshaft end. This is of course the conventional arrangement of cone-type friction gears. However, it makes it possible to allow slip to take place in starting from rest or on hills. In the Robertson variable-speed gear this is impossible as a disk clutch is interposed between the hollow cone and the propeller shaft, and is so designed that it must slip before the friction drive. Furthermore, it is the friction drive which engages the friction gear and not the driver.

This action is obtained by the mechanism, which also varies the gear ratio automatically. The coned face of the flywheel is in reality a separate part, and by the action of a form of centrifugal governor within the flywheel it is made to slide out away from the flywheel proper as the engine speed increases. This has the effect of moving the hollow cone downward, so raising the gear ratio. The outward movement of the flywheel cone naturally forces it against the hollow cone, thus increasing the pressure on the friction surfaces, and it also pushes the hollow cone against the disk clutch so that the drive is transmitted to the propeller shaft.

On the road the operation of driving is simple. Normally, when the engine is not running, or is only idling, the hollow cone is in its highest position, giving the lowest gear ratio, but there is no pressure on the disk clutch and therefore the car remains at rest. As soon as the accelerator is depressed the clutch is automatically engaged and the car moves off, the gear ratio rising as it gathers speed, that is, as the resistance to movement is overcome. To slow down it is only necessary to release the accelerator; then the gear ratio gradually falls, and as the brake is applied to bring the car actually to rest the clutch disengages and the engine ticks over quietly. On a gradient the gear ratio falls as the resistance increases. (*The Autocar*, vol. 61, no. 1716, Sept. 21, 1928, p. 610, 2 figs., *d*)

The Armstrong Siddeley Self-Changing Gear

THIS is a new four-speed gear box intended to be used on an Armstrong Siddeley car. It is so arranged that one pedal and a small lever in the center of the steering wheel are all that is necessary to control it. The gear consists of trains of concentric gears of the internally-toothed-ring and sun-and-planet type. These gears are always in mesh. Each train is caused to take over the drive when required by a special form of compounded self-aligning and self-adjusting contracting bands which grip the desired gear drums when brought into play.

All the driver has to do is this: When the car is at rest, press the pedal to its full extent and move the little selector lever with two fingers round to a mark on the disk in the center of the steering wheel which says "low." He then depresses the gear pedal to its full extent, and gently releases the pressure, using the accelerator of the engine in a normal manner when the car starts. Having started, he moves the selector lever to a position marked "medium," with no more care than he would take in switching on the head lamps, and then fully depresses the pedal and lets it rise again, when second gear is in. Other gears are engaged in precisely the same way, and a change from any one gear to any other can be made without the least difficulty. It is possible, indeed, to change from first to reverse and to pull the car up with the gear pedal until it runs backward.

An interesting part of the mechanism is the way in which the self-locking selector mechanism is operated from a little lever on the steering wheel. The details are not stated, but it is said that the selector chooses the gear. The control pedal cuts out the gear that was being used on its downward movement, and on its upward movement sets the fresh train to work. (*The Autocar*, vol. 61, no. 1717, Sept. 28, 1928, pp. 665, 1 fig., *d*)

POWER-PLANT ENGINEERING (See also Materials Handling: Pneumatic Coal Conveyors)

The Löffler 1700-Lb-Pressure Steam Power Plant

IN THE Löffler system of steam generation (see MECHANICAL ENGINEERING, vol. 48, May, 1926, p. 512), the boiler is a horizontal cylindrical vessel to which the heat is supplied not by the combustion of the fuel in contact with it, but by forcing highly superheated steam through the water by means of a pump. Pressures of the order of 100 atmos. and over can be produced by this system. A plant having an output of 2000 kw. has been installed by the Vienna Locomotive Works and has now been in operation for nearly a year, working for about 2500 hr. during that period. It comprises two reciprocating engines supplied with steam at a pressure of 1700 lb. per sq. in. and a temperature of 900 deg. fahr. Each of the engines has an indicated output equivalent to 400 kw. Steam is exhausted at a pressure of 170 lb. per sq. in. and a temperature of 390 to 445 deg. fahr. to another type of engine developing 1200 kw. Each of the high-pressure engines has one double-acting cylinder of $6^3/_4$ in. bore with a piston stroke of $17^3/_4$ in., and runs at about 300 r.p.m. with a mean effective pressure of 570 lb. per sq. in. Steam is distributed by valves located in the cylinder ends and operated by eccentrics on a layshaft driven from the crankshaft through gearing and a vertical shaft.

The Löffler boiler used with the installation comprises two drums, each $31^1/_2$ in. in diameter and 23 ft. in length, and is capable of generating 16,500 lb. of steam per hr. at the pressure and temperature previously mentioned. The grate area is 80.7 sq. ft., and the air for combustion passes through a heater having a heating surface of 2153 sq. ft., in which its temperature is raised to between 300 deg. and 390 deg. fahr. The feed heater is of the same area as the air heater, viz., 2153 sq. ft., and the area of the superheater is 1776 sq. ft. It is claimed that the plant has a thermal efficiency of 30 per cent, which is about equal to that of a Diesel engine; but since the Löffler plant uses coal instead of oil, the fuel costs are very considerably lower. The first cost of the installation is also stated to be not greatly in excess of one of the same capacity operating at a moderately high pressure of some 400 lb. to 700 lb. per sq. in. (*Engineering*, vol. 126, no. 3268, Aug. 31, 1928, p. 260, 2 figs., *d*)

Drumless Boilers

Drumless or "series" boilers have been developed by the Babcock & Wilcox Company. This name applies to boilers which either have no steam or water drums at all or employ small drums arranged as shown in Fig. 3. This type has a natural circulation. The unit under consideration was made up of 2-in. tubes and the steaming economizer of 1-in. tubes; the surface of the economizer was 3.7 times that of the heating surface of the boiler.

This experimental boiler was used in the development of the Calumet boiler. Use of higher pressures made it later desirable

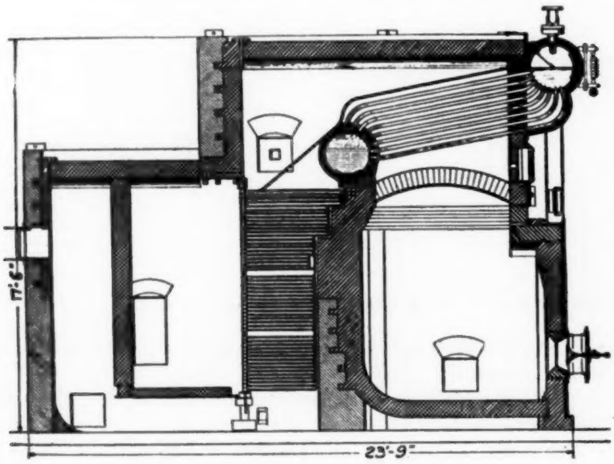

Fig. 3 One of the Boilers Used in the Tests Leading Up to the Development of the Calumet Boiler

to carry out experiments on a drumless boiler provided with forced circulation. (Fig. 4.)

Feedwater was fed continuously to the boiler, first passing through the tubes, which acted as an economizer, and then to the tubes in which steam was formed. The steam with some excess water was then passed through a separator fitted with a gage glass and drain. The water was drained continuously from the separator, and the rate at which the boiler was fed was adjusted so as to hold the height of the water in the gage glass within a given range. Steam from the separator passed through a superheater placed so that there were 17 rows of drumless-boiler tubes between it and the furnace.

There was no trouble with the operation of the boiler, which was run at from 600 to 650 lb. working pressure for a maximum of about 500 per cent of rating, based upon the entire surface, including that part acting as an economizer. There was trouble with the brickwork in the oil-fired furnace, but with a water-cooled furnace this difficulty would disappear, and a boiler of this sort might successfully be used for certain classes of work.

In the series boilers which were tested, the following elements were embodied: First they were arranged to have comparatively no frictional resistance to flow of steam and water, this amounting to about 20 lb. per sq. in. in the boiler shown in Fig. 3 operated

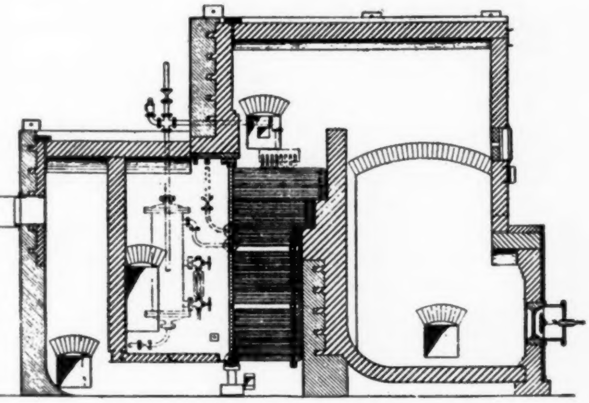

Fig. 4 This Boiler, Upon Which Extensive Tests Were Made, Has No Drums but Consists of the Economizer Part of the Boiler Shown in Fig. 3

at about 550 per cent of its rated capacity on the basis of 10 sq. ft. of total boiler, economizer, and heating surface to the rated horsepower; second, arranged with tubes of the proper diameter so they could be cleaned internally; and third, so that the water in the boiler could be drained out.

Looking into the future and considering possible developments of the drumless boiler, it is evident that by departing from one or another of these features embodied in the experimental boilers it may be possible to build a boiler of cheaper construction. Nobody can say what the ultimate solution will be should drumless boilers come into use for high pressures. In all such boilers the problems of starting up and stopping, and sudden changes of the rate at which steam is used, are much more difficult to handle than in ordinary boilers. (Dr. D. S. Jacobus, Mem. A.S.M.E., in a paper before the Engineers' Society of Western Pennsylvania. Abstracted in *Power Plant Engineering*, vol. 32, no. 20, Oct. 15, 1928, pp. 1087–1088, 2 figs., *dA*)

RAILROAD ENGINEERING

A New German Diesel Locomotive

The Schwarzkopff Diesel locomotive, designed and built by the Berlin Machine Construction Co., is of interest particularly because it is equipped with the Schwarzkopff-Huwiler gear. The propelling machinery comprises a vertical single-acting four-cycle six-cylinder Diesel engine rated at 220 hp. when running at 450 r.p.m.

The hydraulic gear consists of a primary part or pump unit (*d*), a hydraulic motor or secondary part unit (*e*) arranged on the frame, and a rotary sleeve valve (*f*), these three parts being combined in a suitable manner to form one unit by means of pipe connections. One of the principal features of this gear is its infinitely variable regulation of speed from zero to a maximum speed of 40 km. (24.855 miles) per hr., instead of by stages as in the case of change-speed gear mechanism of the gear-box type.

The primary and secondary parts are of the rotary-vane type and substantially alike in construction. The rotor (1) is mounted on the driving shaft (2) and provided with slots (3) for the radial

oscillation of the vanes (4). The latter are fitted with rollers (5) running specially shaped guide grooves cut into plates (6), which are secured to the end covers (7). The pressure and suction sides of the pump are separated from each other by loosely fitting bearing blocks (8), the vanes being withdrawn into the rotor when passing them owing to the flattened contour of the guide grooves. The cylindrical extension of the rotor body to the rear carries the regulating sleeve valve (9). This valve is provided with slots (10) into which the axially moving blades engage. This valve by its axial displacment more or less fills up the working space in its longitudinal direction, so that the pump with a constant number of revolutions delivers more or less fluid, thus constituting the characteristic feature of this form of hydraulic gear, as indicated previously. By this simple device, the motion of which is effected by compressed air, the volume of fluid delivered by the primary pump is infinitely variable from nothing; i.e., when the working space of the pump is entirely filled up by the sleeve valve to maximum, the valve is entirely withdrawn from the working space and the sleeve is in the position shown on the drawing.

Certain tests were made to determine the ability of the gear to give satisfactory service. The total run on a section of about 31 miles, part of which was on the level and part on grades of about 8 per cent, is said to have proved the gear satisfactory. The distance covered in this run was about 1400 km. or 869.9 miles.

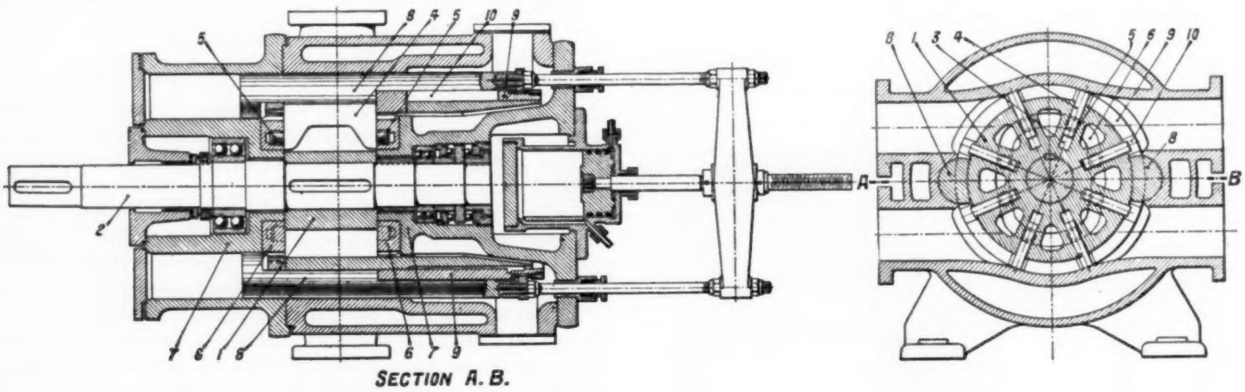

FIG. 5 SCHWARZKOPFF-HUWILER ROTARY SLEEVE VALVE INSTALLED ON A DIESEL-ENGINE LOCOMOTIVE

The time taken by the trial trains on the up and down journeys was 3 hr. 10 min., giving an approximate average speed of 32 km. (19.884 m.) per hr. The train load was 123 to 150 tons, the train comprising 9 or 10 vehicles, mostly central corridor coaches with end platforms. According to this marshaling, the train resistance was relatively large. From the practical standpoint, the line must be considered as unfavorable on account of the numerous crossings without protection, thus making it necessary to reduce speed or fully stop the locomotive before passing over the highways. Furthermore, as it was impossible to run on the steeper gradients at the scheduled speed of 30 km. (18.641 miles), it became necessary that the locomotive should travel on the level at the maximum obtainable speed, namely, 40 km. (24.855 miles).

The foregoing trial runs produced results which represented a total efficiency at the drawbar of approximately 53 per cent. which figure corresponds to a transmission efficiency of 76 per cent. Bearing in mind that the mean capacity of the Diesel engine was approximately 210 hp. at the flywheel, the fuel consumption per drawbar horsepower-hour would be 530 grams (0.784 lb. per hr.). Measured at the rim of the driving wheels the corresponding figures would be 270 grams (0.604 lb. per hr.), and based on the shaft horsepower-hour the fuel consumption amounts to 187 grams (0.419 lb. per hr.). The latter figure could of course be substantially improved by the adoption of a more modern system of Diesel engine, which, however, in the present instance was not available. (*Railway Engineer*, vol. 49, no. 585, Oct., 1928, pp. 377–379 and 385, illustrated, *d*)

SPECIAL MACHINERY (See also Testing and Measurement: The Stroke-Time Diagram as a Means of Measuring the Performance of Pneumatic Percussion Tools)

The Mechanization of Coal Mines

THE present article deals with the installation at the Kingshill Colliery of the Coltness Iron Company in Scotland. By means of the mechanized method there installed, an output of two tons per man per shift is attained throughout the colliery personnel, including both underground and surface workers, from a seam 2 ft. 2 in. to 3 ft. in thickness.

The outstanding feature of the haulage system is the employment of electric storage-battery locomotives on the main roads. Two such locomotives are available and are provided with twin 20-hp. series-wound railway-type motors which drive the axles through single-reduction gearing. Both the gearing and the motors themselves are totally enclosed. A series-parallel controller is provided, and the locomotives are equipped with various safety devices.

A considerable amount of machinery is employed at the coal face. Twelve face conveyors are in constant operation, together with a corresponding number of coal cutters. There are also installed one Jeffrey scraper-chain gate conveyor and seven gate-end loaders. The shaker type of conveyor appears to have found most favor in the past for use on faces as there are nine of these in employment compared with only three belt units. But in the future it is proposed to extend the use of belt conveyors. Among the special points of the Jeffrey gate conveyor and loader is the single-strand chain which occupies a central position in the pans, and the fact that the attached conveyor elements are prevented from rising off the bottom due to their extremities being held in recesses.

A rather different combination consists of a Dacol belt face conveyor arranged to discharge into a Mavor & Coulson chain loader. The special feature of the conveyor is the "caterpillar" drive, which is claimed to insure a particularly effective frictional grip, while requiring less tension on the conveyor band than is usual with the normal S-bend grip.

The authors of the article, who made a personal survey of the field, point out that the tendency to install a number of different makes of conveyors instead of standardizing on any particular

one is quite marked in various collieries. This practice is no doubt due to a belief in the trial-and-error principle, which has much to commend it in view of almost infinite number of variables which are encountered not only in different pits but in different districts of the same pit. Also the many improvements which have been effected in practically all the leading makes within the last few years is clear proof that finality of design has by means yet been achieved. It would appear that the tendency will be to adopt more or less specialized machines to meet quite a narrow range of conditions. An underground machine that will operate with high efficiency in any special set of conditions in the pit will quickly repay the interest charges on even a heavy number of spare parts, and this fact again militates against a standardized policy.

Fig. 6 shows a typical district layout and illustrates the general method of operation. The cutting duty throughout the colliery is undertaken by chain machines, all makes being provided with 4-ft. 6-in. to 5-ft. jibs. Two men serve each cutter, the holings being filled out by the colliers. The coal readily falls after the cutter has passed, but on one or two of the falls shots are placed at intervals of three yards to bring down the coal, which is loaded into the conveyor system by the strippers at the face.

heating, ventilation, lockers, bath, etc. Accommodations will be provided for 500 men in a single shift to bathe in comfort. The entrance to the bath is less than 20 yd. from the shaft, and the men go in at one and and out at the other. A canteen without the right to sell intoxicating beverages adjoins the building. (*Colliery Engineering*, vol. 5, no. 56, Oct., 1928, pp. 385–394, 19 figs., *d*)

TESTING AND MEASUREMENT

The Stroke-Time Diagram as a Means of Measuring the Performance of Pneumatic Percussion Tools

THE ordinary indicator is not applicable to the measurement of performance of pneumatic percussion tools, and the present article describes a combined method of indication. In this method two curves are plotted, one showing the motion of the percussion piston s in relation to the time t, and the other showing the pressure p inside the hammer in relation to the time t. From these two equations the new relationship $p = f(s)$ can be derived by eliminating t. By multiplying this value by the piston area F, the piston power P is obtained from the working pressure p, since $pF = P$. The area $P \times s$ of the diagram then

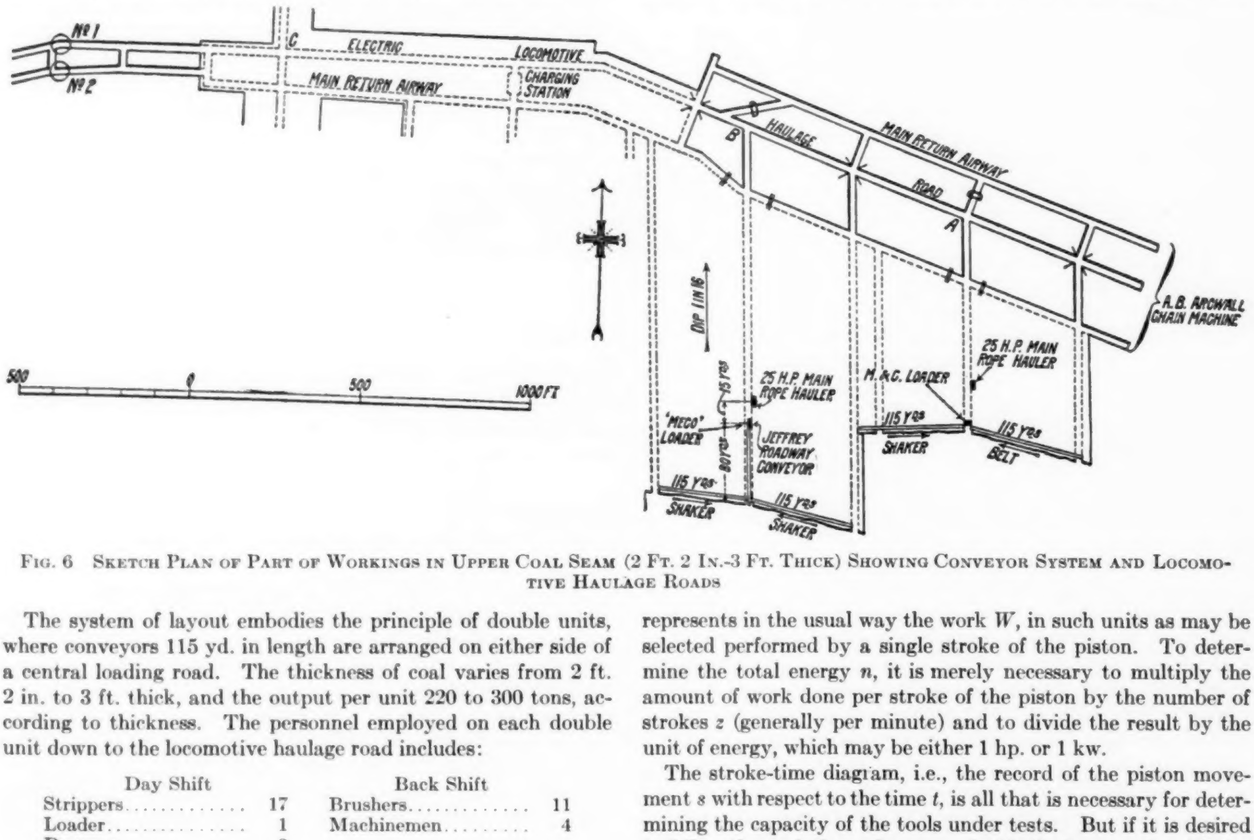

FIG. 6 SKETCH PLAN OF PART OF WORKINGS IN UPPER COAL SEAM (2 FT. 2 IN.–3 FT. THICK) SHOWING CONVEYOR SYSTEM AND LOCOMOTIVE HAULAGE ROADS

The system of layout embodies the principle of double units, where conveyors 115 yd. in length are arranged on either side of a central loading road. The thickness of coal varies from 2 ft. 2 in. to 3 ft. thick, and the output per unit 220 to 300 tons, according to thickness. The personnel employed on each double unit down to the locomotive haulage road includes:

Day Shift		Back Shift	
Strippers	17	Brushers	11
Loader	1	Machinemen	4
Drawers	2		—
Haulage on cost	3		15
Wood boys	2		
	—		
	25		

Night Shift	
Conveyor shifters	8
Pillarmen	2
	—
	10

The article also gives data on the power plant and boilers, screens and washery, and accommodations for men, including

represents in the usual way the work W, in such units as may be selected performed by a single stroke of the piston. To determine the total energy n, it is merely necessary to multiply the amount of work done per stroke of the piston by the number of strokes z (generally per minute) and to divide the result by the unit of energy, which may be either 1 hp. or 1 kw.

The stroke-time diagram, i.e., the record of the piston movement s with respect to the time t, is all that is necessary for determining the capacity of the tools under tests. But if it is desired to follow the variations of pressure inside the hammer in addition to the energy developed, then the second part of the method, that is, the pressure-time indication, must be used, and the results combined with those of the first or stroke-time indication, in order to arrive at the pressure-stroke diagram which shows the performance of a pneumatic hammer.

To carry out the stroke-time indication, a hole is drilled through the percussion piston of the hammer into which is screwed a rod of special material (Fig. 7) 3 to 5 mm. (0.118 to 0.196 in.) thick, according to the cylinder diameter. The forward end of the rod carries a stylus for making the record. By allowing the stylus

to record on the casing of a rotating drum, diagrams such as those shown in Fig. 8 are obtained. The hammer is firmly clamped during the test. In place of the pick, an attachment piece with a flat face, which is also drilled through, is inserted in the hammer, this attachment taking the blows of the piston and making contact with a fixed shoulder (Fig. 9). The hammer is started up by operating a foot-operated valve, and at the same time the drum, with the recording paper wound around it, is

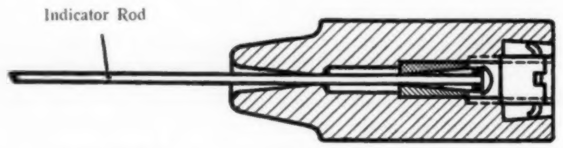

FIG. 7 SECURING THE INDICATOR ROD IN THE PERCUSSION PISTON

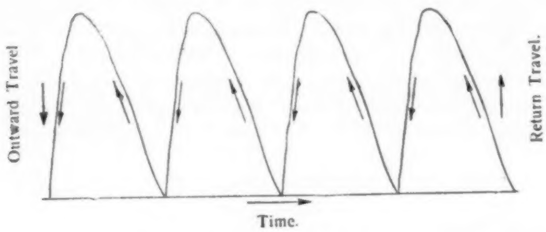

FIG. 8 PERCUSSION DIAGRAMS

under the stylus in 1 sec. is 34/(1000 × 0.0125) = 2.71 meters, i.e., the paper speed is 2.71 m. per sec. As the speed of the motor driving the drum is never perfectly regular, the lengths of the waves will never exactly coincide. Still, a mean figure can be estimated from a number of waves to form a basis for calculating the paper speed.

The single percussion curves of the stroke-time diagram should if possible be such that the angle formed by the descending branch and the time abscissa is about 45 deg. As is shown later in the article, the terminal velocity can then be determined with considerable accuracy. By varying the diameter of the pulley driving the drum, the peripheral speed of the drum can be adjusted to suit a definite number of blows.

A figure in the original article shows a test bench for taking indicator diagrams of pneumatic percussion tools at the Flottmann Works, and details of the operation are given.

It would be possible, by graphically differentiating the stroke-time diagram to plot the velocity curve showing the alteration in the velocity of the percussion piston in terms of time. By further graphically differentiating this latter curve, we should get the piston acceleration in terms of time, because the acceleration $b = dv/dt$. Since the acceleration of the piston is proportional to the pressure acting on the piston, this curve gives at the same time an idea of the variation or pressure. It is safer, however, to determine the pressure by means of the pressure-time curve from the pressure-stroke diagram, which is the reason why the author does not derive the velocity and acceleration curves from the

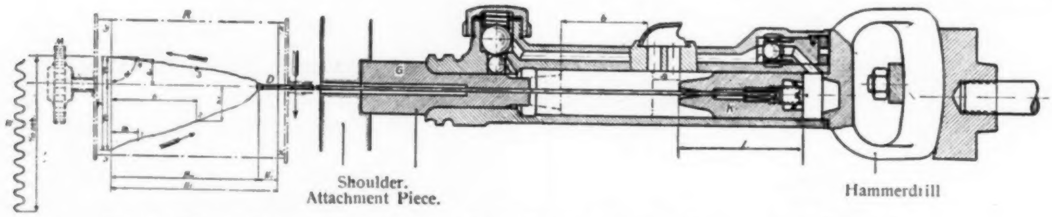

FIG. 9 WAVE TRAIN OF THE TUNING-FORK VIBRATIONS, FOR DETERMINING PAPER SPEED

Duration of a wave = 0.0125 sec., 80 waves = 1 sec.

FIG. 10 TEST ARRANGEMENT FOR TAKING STROKE-TIME DIAGRAMS

made to rotate by an electric motor. The time element appears in the impact diagram as the abscissa, and to enable it to be determined the peripheral speed of the drum must be known. As it would not be sufficiently accurate to calculate the peripheral speed from the diameter and revolutions of the drum, due to the speed fluctuations that are always occurring, a slowly vibrating tuning fork working at 80 vibrations per second is used for recording the time. The tuning fork is vibrated by striking it, and the number of waves is always the same per second regardless of the force of the blow. The train of waves (Fig. 10) is recorded on paper at the same time as the percussion curve by means of a fine stylus attached to the fork, and in this way the paper speed can be determined to a nicety. As the fork makes 80 vibrations a second, or 80 full waves, then, no matter at what speed the drum is revolving, the distance between one wave and the next is always 1/80 = 0.0125 sec. The quicker the speed of the drum, the more drawn out are the waves. Calculating the paper speed with the aid of the tuning-fork vibrations is a very simple matter. By measuring the length of a wave, the amount of travel corresponding to 0.0125 sec. is obtained, say, 34 mm. Since, therefore, 34 mm. of paper pass along the drum in 0.0125 sec.—assuming the speed to be constant—the length of paper passing

stroke-time diagram. (*Der Bohrhammer*, vol. 8, no. 82, English edition, vol. 1, no. 8, Aug., 1928, pp. 145–150, 7 figs., *d*)

A Polar-Diagram Engine Indicator

THIS is said to be the first attempt made to employ an instrument working on the polar-coordinate system to record directly mechanical phenomena such as operation of an engine.

In this case, however, the polar diagram is modified for mechanical reasons and instead of having a point, as the zero, for the diagram, a circle is used as the zero line, and the positive and negative values of pressure are the lengths of the radii vectores outside and inside the zero circle, respectively. This system has already been used for plotting pressure diagrams of high-speed explosion engines as described in a bulletin of the Bureau of Standards (Report No. 107, 1921).

In this case the paper holder is not a drum but a disk; it rotates continuously in the same direction in front of the pencil of the indicator, and its mass is therefore of no importance. In fact, greater mass would contribute to greater uniformity of motion. Furthermore, it is not necessary to place the cords which transmit the movement of the engine to the paper holder as accurately in the new method as in the old, since only a rotary motion is to be maintained, and not one absolutely proportionate to the piston rod. This results in a simplification of the guide rolls.

In the original article two diagrams are shown—the first in rectangular coordinates and the second in polar coordinates—taken for a four-stroke cycle engine. These cannot be repro-

duced here for technical reasons. In the rectangular-coordinate diagram the abscissa representing the stroke is used twice for a steam engine and four times for a gas engine. In a circular diagram the abscissa axis for the strokes forms one continuous line which is a circle and tends to make the diagram much larger than can be obtained in rectangular coordinates. Furthermore as the speed for one revolution is uniform while the movement of the diagram and piston rod follows the sine law, the diagram becomes clearer just at the beginning and end of the stroke where admission, ignition, and exhaust occur. In rectangular coordinates this is just where the movement of the drum is almost zero, so that the important movements of the valves are regarded on very small lengths of abscissa axis. With the new diagram, therefore, a more accurate analysis of the operation of valves, ignition, etc. becomes possible.

This arrangement would give the diagram of just one cycle, or when more diagrams are taken, they would superpose each other. In order to be able to take continuous diagrams as is possible with the drum in an ordinary indicator, an arrangement must be made which, after each cycle, shifts the starting point for the next cycle a little. This can be done in two ways:

1 By using a ratchet which slips a certain amount after each revolution of the paper disk a few degrees.

2 Arranging the gearing so that it is not exactly 1:2 or 1:4 but somewhat more or less, so that one complete cycle is a little less or more than one revolution of the disk. In this way each new cycle starts a little behind the foregoing cycle, and a continuous open diagram is obtained of the kind recorded on the paper drum when the latter is arranged for taking a continuous diagram. The error due to this small slip is negligible. (Max Hartenheim, Pittsburgh, Pa., in *Instruments*, vol. 1, no. 9, Sept., 1928, pp. 405–407, 2 figs., *d*)

VARIA

Distribution of Rolling Costs in Various Countries

THE following features of Fig. 11 deserve special attention. The labor is greater in England than in America, and still greater on the Continent. On the other hand, steam and electric power consumption vary in a way directly opposite, which is of course natural, as any increase of steam and electric power means a greater use of manipulating devices and hence less use of labor.

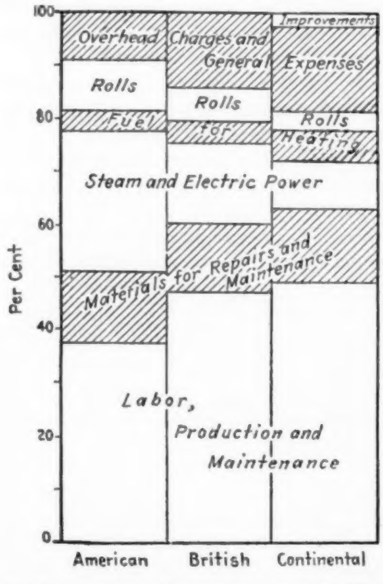

FIG. 11 PERCENTAGE DISTRIBUTION OF ROLLING COSTS
(The American mill was rolling wire rod from the ingot; the British, sheet bar; the Continental, semi-finished shapes and railroad material.)

A more significant feature is the cost of rolls, which is greatest in America and least on the Continent. This would seem to be due to the fact that in America, where production depends on the use of mechanical devices, the rolls are worked harder, while on the Continent the production is slowest and the life of the rolls longest.

One outstanding difference between British and American rolling-mill practice lies in the much more onerous demands made upon production equipment in the United States. The author cites an average blooming mill, which in the United States would be expected to roll monthly about 60,000 tons of ingots into 6 × 6-in. blooms. He gives an example from the Ensley works of the Tennessee Company, in which the average tonnage on a 12-hr. shift (in 1923) was 1730, making 144 tons an hour. The blooming-mill rolls made 684 passes an hour in the six turns surveyed. This was in rolling 24 × 24-in. ingots weighing 10,800 lb., with a few larger ingots up to 14,000 lb. Few plants in Great Britain with anything like such an output would rely on one blooming mill. The author refers to several rolling about 30,000 tons a month and doing it on two mills.

Medium-sized merchant mills in the United States are stated to be turning out from 6000 to 7000 tons a month, while the production of a corresponding plant of the same general type in England is between 1500 and 3000 tons. (G. A. V. Russell in a paper before the Institution of Mechanical Engineers, abstracted through *The Iron Age*, vol. 122, no. 12, Sept. 20, 1928, p. 692, *g*)

CLASSIFICATION OF ARTICLES

Articles appearing in the Survey are classified as *c* comparative; *d* descriptive; *e* experimental; *g* general; *h* historical; *m* mathematical; *p* practical; *s* statistical; *t* theoretical. Articles of especial merit are rated *A* by the reviewer. Opinions expressed are those of the reviewer, not of the Society.

Growth of Chemical Nitrogen Production

IN THE year ending June 30, 1928, the world's production of chemical nitrogen—that is, natural, by-product, and synthetic, and not including farm manures, city and packing-house wastes, and such like organics, was approximately 1,600,000 metric tons. The world's consumption, both technical and agricultural, of these forms of nitrogen was about 1,400,000 metric tons. Somewhat more than half of this production came from the synthetic plants, and correspondingly less than half from by-product and natural sources.

Production of natural nitrogen reached a peak during the war, and since its close has shown more or less tendency to decline somewhat more marked during the later years. Whether it regains its former supremacy is doubtful.

By-product nitrogen has shown a general continued increase over many years, though suffering slightly from the post-war industrial depression affecting all countries. Its growth is slow, and there is little likelihood of this source speeding up production, a natural consequence of its by-product nature. On the other hand, it is a source of production that cannot be displaced very easily by competitive producers.

Were natural and by-product sources of nitrogen merely to hold present production rates, the present fixation plants, completed and under construction, would bring the world's production in 1930 to about 2,000,000 tons of nitrogen, rather more than less.—W. S. Landis in *Industrial and Engineering Chemistry*, November, 1928, p. 1144.

Engineering and Industrial Standardization

American Standards Association Established by Vote of Member-Bodies

UNANIMOUS approval of the thirty-seven member bodies of the establishment of the American Standards Association to succeed the American Engineering Standards Committee, is officially announced by William J. Serrill, assistant general manager of the United Gas Improvement Company of Philadelphia, chairman of the Standards Committee and now president of the American Standards Association. One of the most important results of the abandonment of the committee form of organization will be a much greater degree of participation by trade associations in the direction of the national industrial-standardization movement.

One of the first acts of the Association will be the organization of a Board of Directors composed of twelve industrial executives. This newly created board, which is provided for in recognition of the increasing part which executives are playing in the standardization movement, will control the general administration and policies of the Association. The old Main Committee made up of representatives of all the member-bodies, now becomes the Standards Council, and in its hands will rest all matters connected with the adoption and approval of American standards.

The officers of the Association are, in addition to Mr. Serrill: Cloyd Chapman, vice-president; P. G. Agnew, secretary; and F. J. Schlink, assistant secretary. The advisory committee of industrial executives includes: J. A. Farrell, president of the U. S. Steel Corporation, chairman; George B. Cortelyou, president of the Consolidated Gas Company; John W. Lieb, senior vice-president of the New York Edison Company; L. F. Loree, president of the Delaware & Hudson Company; and Gerard Swope, president of the General Electric Company.

It will be recalled that the American Engineering Standards Committee was organized in 1917 by the American Society of Civil Engineers, the American Institute of Mining Engineers, The American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Society for Testing Materials. The purpose of the organization was to provide a method of cooperation which would prevent duplication in standardization work and the promulgation of conflicting standards. The United States Government Departments of War, Navy, and Commerce became members of the committee in 1919. New members were from time to time added, until at the time of the present reorganization there were 37 member-bodies. There are in addition 350 sustaining members, including manufacturers, distributers, associations, etc.

A broad range of industries and of types of standards are included in the work of the Association. The following types of standards are covered:

1 Nomenclature. Definitions of technical terms used in specifications and contracts and in other technical work.
2 Uniformity in dimensions necessary to secure interchangeability of parts and supplies, and the interworking of apparatus.
3 Quality specifications for materials and equipment.
4 Methods of test.
5 Ratings of machinery and apparatus which establish test limits under specified conditions as a basis of purchase specifications, or which establish requirements as to performance, durability, safety, etc. under operation.
6 The codifying of provisions for safety.
7 Rules for the operation of apparatus and machinery in industrial establishments.
8 Concentration upon the optimum number of types, sizes, and grades of manufactured products.

The method of work is simply a systematic plan of cooperation by which organizations interested in any particular project participate (1) in deciding whether the work shall be undertaken at all, (2) in formulating the standard, and (3) in its ultimate approval as an "American Standard."

The decision as to whether work on a standard shall be undertaken is made by a general conference of representatives of all the groups concerned with the standard, or by any equivalent method which assures a consensus of opinion. One of the most important results of the reorganization is the more flexible procedure for adopting standards now available. Four methods are provided:

1 By sectional committees, which are essentially joint committees made up of officially accredited representatives of all groups having an important interest. The sectional committees may work:
a Under the administrative support and direction of one or more of the bodies principally concerned—termed "sponsors."
b Autonomously, reporting directly to the American Standards Association.
2 The approval of existing standards when it may be shown that the standard represents a real consensus.
3 By the approval of "proprietary" standards when it may be shown that they are supported by a consensus of those substantially concerned.
4 By the official acceptance of the interested groups concerned.

The United States Government cooperates actively with the Association in several ways. In addition to the seven branches of the Federal Government represented on the Standards Council, 38 branches are represented on sectional committees. Twenty-one Association projects are sponsored by various branches of the Federal Government which are represented on almost every sectional committee working under Association procedure. The Department of Labor is cooperating in all safety-code work and is publishing approved safety codes as Government documents. The association assists the Federal Specifications Board by circulating proposed specifications for criticism by industry in order to determine their acceptability to industry.

There are now national standardizing bodies similar to the American Standards Association in 19 foreign countries. The Association is constantly in touch with these, and all standards are exchanged. National standards developed abroad are thus made available in this country for the use of exporters, manufacturers, and others.

Up to the time of its reorganization into the American Standards Association 285 projects were given official status, as follows:

Civil engineering and building trades	35
Mechanical	77
Electrical	53
Automotive	5
Transportation	10
Naval architecture and marine engineering	1
Ferrous metallurgy	4
Non-ferrous metallurgy	10
Chemical	8
Textile	2
Mining	19
Wood	5
Pulp and paper	2
Petroleum	19
Miscellaneous	35
	285

The member-bodies of the American Standards Association are:

American Electric Railway Association
American Gas Association
American Gear Manufacturers Association
American Institute of Architects
American Institute of Electrical Engineers
American Institute of Mining and Metallurgical Engineers
American Mining Congress
American Railway Association—Engineering Division
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Testing Materials
Association of American Steel Manufacturers
Cast Iron Pipe Research Association
Electric Light and Power Group:
 Association of Edison Illuminating Companies
 National Electric Light Association
Fire-Protection Group:
 Associated Factory Mutual Fire Insurance Companies
 National Board of Fire Underwriters
 National Fire Protection Association
 Underwriters' Laboratories
Gas Group:
 Compressed Gas Manufacturers Association
 International Acetylene Association
National Association of Machine Tool Builders
National Automatic Sprinkler Association
National Electrical Manufacturers Association
The Panama Canal
Portland Cement Association
Safety Group:
 National Bureau of Casualty and Surety Underwriters
 National Safety Council
Society of Automotive Engineers
Telephone Group:
 Bell Telephone System
 United States Independent Telephone Association
U. S. Department of Agriculture
U. S. Department of Commerce
U. S. Department of the Interior
U. S. Department of Labor
U. S. Navy Department
U. S. War Department.

Recent Committee Meetings

DURING the two-week period from October 18 to November 2, eleven committee meetings were held in the Engineering Societies Building, New York, N. Y. Brief summaries of the progress made at each of these meetings are recorded below.

Speeds of Driven Machines. On Thursday, October 18, the Sectional Committee on the Standardization of Speeds of Driven Machines was organized at the Engineering Societies Building in New York. At the time of organization the Committee consisted of twenty-nine members, representing twenty-six societies and associations. Twenty-four persons attended the meeting.

Allen E. Hall, Manager, Milling Machinery Department, Allis-Chalmers Manufacturing Company, was elected temporary chairman, and W. S. Hays, Secretary, Power Transmission Association, was elected temporary secretary.

The scope of the work to be undertaken and its subdivision was discussed, and finally a Sub-Committee on Plan and Scope consisting of seven members was elected. This Sub-Committee with A. E. Hall, Chairman, and W. S. Hays, Secretary, was empowered to designate the sub-committees and appoint their personnel.

Mechanical Standards Advisory Council. The Temporary Executive Committee of the Mechanical Standards Advisory Council held a meeting in the Engineering Societies Building on October 22. Alfred J. Jupp, Temporary Chairman, presided. The Committee reviewed carefully and approved the proposed constitution of the Council in its revised form. The chairman was then directed to issue invitations to the 51 organizations which are considered to be included within the mechanical industries group calling the first meeting of the Council for Monday afternoon, December 3, in the rooms of The American Society of Mechanical Engineers.

Bolt, Nut, and Rivet Proportions. This Sectional Committee held a large meeting on Tuesday, October 23, in the Council Room of the Society. Chairman Arthur E. Norton presided.

The Committee ratified the letter ballot recommending the change of the status of the standard for Tinners', Coopers' and Belt Rivets from a "Tentative American Standard" to an "American Standard."

The proposed standard for Slotted-Head Proportions was discussed, and certain recommendations for changes were approved. Chairman E. W. Reed is to submit a finally revised draft for the Committee's final approval.

The modifications in the standard for Wrench-Head Bolts and Nuts approved as a Tentative American Standard in February, 1927, were discussed. These proposed changes have been submitted by the manufacturers' organization known as the Bolt, Nut, and Rivet Institute. The Committee finally agreed to submit to letter ballot, with recommendation for approval, the increase in the cross-dimension of the $^5/_8$-in. nut from $^{15}/_{16}$ in. to 1 in., and the same dimension of the $^3/_4$-in. nut from $1^1/_8$ in. to $1^3/_{16}$ in.

Sub-Committee No. 6 on Brass-Seat Unions. The organization meeting of this Sub-Committee, held October 23, was well attended by representatives of the manufacturer and user groups. The Committee decided first to limit its activity to the standardization of certain important elements of brass-seated unions for pressures of 300 lb. and greater.

The Mechanical Division of the American Railway Association was well represented, and its delegates announced that in a short time they would be able to define definitely the railroad requirements for this type of fitting. The Committee recognized the interests of the oil industry and the marine industry in the development of this standard, and requested the sponsor bodies to arrange for increased representation from these two groups.

When the railway group has completed the drafting of its requirements, they will be submitted to a Sub-Group of the manufacturers for review and comment. This last-named group elected Charles H. Stebbins temporary chairman, and R. A. Corley, temporary secretary.

Sub-Committee No. 1 on Cast-Iron Pipe Flanges and Flanged

NEW AMERICAN STANDARDS

The following standards were approved by the A.S.A. during the month of October 15–November 15, 1928:

Storage Batteries (American Standard.)

Proprietary Sponsor—American Institute of Electrical Engineers. Published by the A.I.E.E.

Railway Motors (American Standard.)

Sponsored by the American Institute of Electrical Engineers. Published by the A.I.E.E.

Scheme for Identification of Piping Systems. (Recommended American Practice.)

Sponsored by the National Safety Council and The American Society of Mechanical Engineers. Published by the A.S.M.E.

Fittings. At the meeting of the Committee on October 24 the recommendations of the Sub-Committee on Gas and Air Piping of the Sectional Committee on the Code for Pressure Piping were discussed in connection with the proposed tentative American Standard for 25-lb. Cast-Iron Pipe Flanges and Flanged Fittings. A revision of the draft of the proposed standard dated January, 1928, was recommended. The proposed tentative American Standard for 800-lb. Hydraulic Cast-Iron Pipe Flanges and Flanged Fittings was also discussed and approved.

Sectional Committee on Shafting. At the meeting of the Sectional Committee on the Standardization of Shafting held October 31, Cloyd M. Chapman, Chairman, it was decided to extend the tentative American Standard on Cold-Finished Shafting to include standard diameters for forged shafting from 6 in. to 16 in. It was further recommended that the tentative American Standard for Square and Flat Stock Keys be revised to include the $^{1}/_{16}$-in. square key and the $^{5}/_{16} \times {}^{1}/_{4}$-in. flat key for use on shafting having diameters of $1^{1}/_{4}$, $1^{5}/_{16}$, and $1^{3}/_{8}$ in. The Committee voted to make a study of the various types of multiple keys and the desirability of their Standardization.

Sectional Committee on Screw Threads for Small Hose Couplings. The organization of the Sectional Committee on the Standardization of Screw Threads for Small Hose Couplings was held at the A.S.M.E. Headquarters on October 26. H. W. Bearce, chief of the Gage Division of the Bureau of Standards, was elected temporary chairman of the Sectional Committee, and Arthur L. Brown, engineer in charge of Factory Mutual Laboratories of the Associated Factory Mutual Fire Insurance Companies, was elected secretary. The development of the preliminary proposals will be undertaken by two sub-committees, one for hose couplings to be used with fire-fighting equipment, and the other for small hose couplings in general use.

Standardization of Plumbing Equipment

IMPORTANT developments may be expected to follow from the organization of the new Sectional Committee on the Standardization of Plumbing Equipment which took place in the United Engineering Building, New York City, on November 2, 1928. The American Standards Association (formerly the A.E.S.C.) had authorized this new project and had named the American Society of Sanitary Engineering and The American Society of Mechanical Engineers as joint sponsor bodies.

Some months prior to the meeting the sponsors issued invitations to all the national organizations known to be interested in this project, requesting the appointment of official representatives for membership on this Sectional Committee. Eighteen, including certain Government departments, accepted and sent representatives to the meeting. These organizations are as follows: American Ceramic Society, American Civic Association, American Gas Association, American Hotel Association of the United States and Canada, American Institute of Architects, American Marine Standards Committee, American Society of Mechanical Engineers, American Society of Sanitary Engineering, Building Managers and Owners Association of New York, Copper and Brass Research Association, National Association of Building Owners and Managers, National Association of Master Plumbers, National Association of Real Estate Boards, National Pipe and Supplies Association, Plumbing and Heating Industries Bureau, Soil Pipe Manufacturers Association, U. S. Navy Department, and the U. S. Department of Commerce. The manufacturers were represented by ten delegates who are connected with all of the principal firms manufacturing the various types of equipment, including all types of plumbing fixtures.

Dean Collins P. Bliss, Chairman, A.S.M.E. Standardization Committee, presided at the meeting, and after a few formalities the Committee discussed the balance of its personnel as representative of producers, consumers, and general interests. As a result of this discussion the sponsor societies were requested to extend invitations to certain organizations and to a number of individuals, the latter to become "Members at Large."

The wording of the scope of this undertaking was then given some attention and that proposed by the A.S.A. was accepted without modification. It reads as follows: "Standardization of plumbing equipment, including materials, uniformity of roughing-in dimensions, efficiency of operation, and other performance specifications."

The election of officers was then in order, and William C. Groeniger, consulting sanitary engineer, of Columbus, Ohio, was unanimously chosen the permanent chairman of the Sectional Committee. Responding to a request from the Committee, Clifford B. LePage, Assistant Secretary, The American Society of Mechanical Engineers, agreed to accept the temporary secretaryship.

In thanking the Committee for its confidence Mr. Groeniger stressed the importance of the nation-wide adoption of minimum-standard plumbing regulations. He pointed out that through the activities of the department of Commerce Building Code Committee such a set of minimum requirements had been proposed by the Sub-Committee of which George C. Whipple is chairman. In Mr. Groeniger's opinion a universal, minimum-standard plumbing code in the United States is just as sensible and practicable as the standardization of our language, our currency, the gage of railroads, the threads of bolts and nuts, rubber tires, and other matters which have stood for simplicity and economy. As the plumbing regulations of the several states and cities of our country are unified, the standardization and simplification of the interchangeable features of plumbing fixtures will be made possible. Standardization means efficiency and economy in practice. It is understood, of course, that sacrificing efficiency for economy would be false economy.

It will be the business of this Sectional Committee through the activity of its Sub-Committees to establish American standard roughing-in dimensions for plumbing fixtures, American standards of performance of these fixtures, and American standard dimensions for certain interchangeable parts. These standards will then be available for inclusion and reference in the several local and state plumbing codes until a national code is adopted. Craftsmanship and ingenuity are possible under standardization. Standardization does not mean a limitation of methods used. A universal minimum-standard plumbing code does not limit the engineer, the architect, or the plumber to a fixed design. The kind of material, the method of jointing materials, the type of fixture can all vary, but the methods applied must bring the same result.

In order that the early work of the Department of Commerce through its Division of Simplified Practice might be given full recognition and properly coordinated with the present broad movement, the committees set up in Washington, were recognized as Sub-Committees 1, 2, 3, and 4 of the new Sectional Committee. A complete list of Sub-Committes and their chairmen is given below:

Sub-Committee No. 1, George C. Whipple, Chairman. The personnel of this Commitee is identical with that of the Sub-Committee on Plumbing of the U. S. Department of Commerce Building Code Committee.

Sub-Committee No. 2, A. M. Maddock, Chairman. The personnel of this Committee is identical with that of the Standing Committee on Staple Vitreous China Plumbing Fixtures.

Sub-Committee No. 3, George E. Hoffman, Chairman. The personnel of this Committee is identical with that of the Standing Committee on Staple Procelain (all clay) Plumbing Fixtures.

Sub-Committee No. 4. The personnel of this Committee will be identical with that of the Standing Committee on Enameled Sanitary Ware when it is appointed.

Sub-Committee No. 5. Waste Traps. Chairman to be named. The Sectional Committee recognized the Standing Committee on Lavatory and Sink Traps, H. C. Buckley, Chairman, as a Sub-Group to function under this Sub-Committee.

Sub-Committee No. 6, Brass Plumbing Products. Chairman to be announced later.

Jere L. Murphy, the representative of the National Association of Master Plumbers of the United States, expressed complete satisfaction with this set-up, and voiced the hope that eventually each of the sub-committees would have adequate representation of men experienced in the practical considerations effecting the design of plumbing systems and the installation of plumbing equipment. In his opinion these sub-committes should combine the exact knowledge of the architect, the manufacturer, the plumber who is to install the system and the equipment, and the general public who is to pay the bill.

Mr. Murphy reminded the Committee that up to 1880 no one could live in a building more than four stories high. Now, in New York, buildings fifty stories high are not uncommon. This development has been made possible, to a large extent, through the efforts of the master plumbers of the country. Through their national and local organizations they have fostered the formulation of plumbing codes, the requirements of which are designed solely to safeguard the health of the people. In closing his remarks he pledged the complete cooperation of the National Association of Master Plumbers of the U. S. to this Sectional Committee.

Those interested in this project are advised to have their names placed on the mailing list to receive preliminary drafts of the reports of the Sub-Committees and other related papers. Address C. B. LePage, care of A.S.M.E., 29 West 39th Street, New York, N. Y.

A.S.M.E. Boiler Code Committee Work

THE Boiler Code Committee meets monthly for the purpose of considering communications relative to theBoiler Code. Any one desiring information as to the application of the Code is requested to communicate with the Secretary of the Committee, 29 West 39th St., New York, N. Y.

The procedure of the Committee in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and published in MECHANICAL ENGINEERING.

Below are given records of the interpretations of the Committee in Cases Nos. 603–608, inclusive, as formulated at the meeting on September 13, 1928, all having been approved by the Council. In accordance with established practice, names of inquirers have been omitted.

CASE No. 603

Inquiry: Is it necessary for the construction of enameled vessels, that a dished head convex to pressure must be inserted into the shell with a driving fit and then constricted on the end to a smaller diameter than the original as required by Par. U-74 of the code? It is felt that this requirement should not apply to enameled vessels.

Reply: It is the opinion of the Committee that this requirement is not intended to apply under the conditions of construction involved for enameled vessels in Pars. U-97 to U-109, and that for such purpose the head may be inserted in the shell and welded to the edge thereof as shown in Fig. U-3*k* of the Code.

CASE No. 604

Inquiry: Is it permissible under the Code for Miniature Boilers to insert flanged threaded rings for the washout openings in openings in the shell from the interior and secure them in place by welding on the exterior?

Reply: It is the opinion of the Committee that if the flanged ring is arranged as stated in the inquiry so as to carry the stress due to steam pressure, the welding thereof as described will not conflict with the requirements of the Code.

CASE No. 605

Inquiry: What is the maximum permissible diameter under the Code for Low-Pressure Heating Boilers for a corrugated semi-cylindrical furnace top or crown sheet without staybolt or other mechanical supports?

Reply: The Code for Low-Pressure Heating Boilers has no requirements that pertain to a construction of the sort. It is the opinion of the Committee that where a construction is contemplated the stresses in which are difficult to compute, it will be advisable to subject a full-sized sample to hydrostatic test until the construction passes the yield point, using special indicating apparatus to show the stresses that develop therein.

CASE No. 606

Inquiry: Should the heating surface contained in an integral economizer be added to the heating surface of the boiler in determining the minimum safety-valve relieving capacity required by Par. P-274, it being understood that in any event the requirements of Par. P-270 are to be met?

Reply: It is the opinion of the Committee that the heating surface on which to base the minimum safety-valve relieving capacity required by Par. P-274 shall not include any economizer surface.

CASE No. 607

(In the hands of the Committee)

CASE No. 608

Inquiry: a In the calculation of the maximum allowable working pressure of a locomotive-type boiler shell with a tapered course, what diameter is to be used?

b In locating a dome on the tapered course of a locomotive-type boiler shell, what diameter of the tapered course should be used for establishing the limit of size of the dome as provided for in Par. P-194?

Reply: a It is the opinion of the Committee that the maximum allowable working pressure of a tapered-course shell should, in applying the formula in Par. P-180, be based on the maximum diameter of the tapered course.

b In applying the limitation of dome diameter given in Par. P-194, to a dome located on a tapered course, it is the opinion of the Committee that the maximum allowable diameter of the dome should be based on that diameter of the tapered course which intersects the axis or center line of the dome.

The Conference Table

THIS Department is intended to afford individual members of the Society an opportunity to exchange experience and information with other members. It is to be understood, however, that questions which should properly be referred to a consulting engineer will not be handled in this department.

Inquiries will be welcomed at Society headquarters, where they will be referred to representatives of the various Professional Divisions of the Society for consideration. Replies are solicited from all members having experience with the questions indicated. Replies should be as brief as possible. Among those who have consented to assist in this work are the following:

ARCHIBALD BLACK, *Aeronautic Division*	*J. L. WALSH,* *National Defense Division*
A. L. KIMBALL, JR., *Applied Mechanics Division*	*L. H. MORRISON,* *Oil and Gas Power Division*
H. W. BROOKS, *Fuels Division*	*W. R. ECKERT,* *Petroleum Division*
R. L. DAUGHERTY, *Hydraulic Division*	*F. M. GIBSON and W. M. KEENAN,* *Power Division*
WM. W. MACON, *Iron and Steel Division*	*WINFIELD S. HUSON,* *Printing Industries Division*
JAMES A. HALL, *Machine-Shop Practice Division*	*MARION B. RICHARDSON,* *Railroad Division*
CHARLES W. BEESE, *Management Division*	*JAMES W. COX, JR.,* *Textile Division*
G. E. HAGEMANN, *Materials Handling Division*	*WM. BRAID WHITE,* *Wood Industries Division*

Machine Shop Practice

Critical Speeds of Cast-Iron Gears

MS-1 What are the critical speeds of cast-iron gears in feet per minute?

(*a*) The following explanation may be of assistance:

1 The final limit is that speed at which the cast-iron ring would burst due to centrifugal force.

2 There are an infinite number of intermediate speed limits dependent primarily on:

- *a* The imposed load and whether uniform or shock
- *b* The character of the metal, heat treatment, etc.
- *c* The accuracy of gear cutting
- *d* The size and form of the gear teeth: pitch, depth, tip relief, pressure angle, fillet
- *e* The gear action: spur, helical, long addendum, size of driver and mate
- *f* The gear mounting: bearings, shafts, housing, gear blanks, balance, and lubrication.

3 Research now being carried on at the Massachusetts Institute of Technology has included a study of the dynamics involved, but the Progress Reports of the A.S.M.E. Committee on Strength of Gear Teeth have not yet given a formula suitable for general use. (F. A. Brooks, Berkeley, Calif.)

(*b*) Any speed that exceeds 600 ft. per min. is liable to prove disastrous. The writer has conducted a series of experiments with cast-iron gears under working conditions and has worked out Table 1 as a guide in the selection of safe gear materials for various speeds.

Explanation of Table. In the first column are the various speeds in ft. per min., denoted by V, which range from zero to 2400 ft. per min.

TABLE 1 VALUES OF S FOR VELOCITY V

V ft. per min.	Cast iron		Phosphor bronze		Machine steel		Heat treated chrome-nickel	
00	8000		12000		16000		32000	
50	7620		11430		15240		34080	
100	7378		11067		14756		29512	
150	7136		10704		14272		28544	
200	6900		10350		13800		27600	
250	6670		10005		13340		26680	
300	6450	Safe speeds	9675		12900		25800	
350	6240		9360		12480		24960	
400	6035		9052		12070		24140	
450	5836		8754		11672		23344	
500	5646		8469		11292		22584	
550	5460		8190		10920		21840	
600	5280		7920	Safe speeds	10560		21120	
650	5107		7660		10214		20428	
700	4940		7410		9880		19760	
750	4778		7167		9556		19112	
800	4620		6930		9240		18480	
850	4470		6705		8940		17880	
900	4323	Unsafe speeds	6485		8646	Safe speeds	17292	Safe speeds
950	4182		6273		8364		16728	
1000	4045		6067		8090		16180	
1050	3912		5868		7824		15648	
1100	3783		5674		7566		15132	
1150	3660		5490		7320		14640	
1200	3557		5336		7114		14228	
1250	3440		5160		6880		13760	
1300	3329		4994		6658		13316	
1350	3219		4828		6438		12876	
1400	3113		4660		6226		12452	
1450	3017		4516		6022		12044	
1500	2912		4368	Unsafe speeds	5824		11648	
1550	2818		4227		5636		11272	
1600	2725		4088		5450		10900	
1650	2636		3954		5272		10544	
1700	2550		3825		5100		10200	
1750	2467		3700		4934		9868	
1800	2386	Critical speeds	3579		4772		9544	
1850	2308		3462		4616		9232	
1900	2232		3348		4464		8928	
1950	2159		3238		4318		8836	
2000	2088		3132		4176		8352	
2050	2020		3030		4040		8080	
2100	1954		2937	Critical speeds	3908	Unsafe speeds	7816	
2150	1890		2835		3780		7560	
2200	1828		2742		3656		7312	
2250	1768		2652		3536		7072	
2300	1710		2565		3420		6840	
2350	1654		2481		3308		6616	
2400	1600		2400		3200		6400	

The second column gives the corresponding values of S for cast iron, and it will be noted that 600 to 1200 ft. per min. have been termed the unsafe speeds, and instead of making the gears of cast iron it would be best to go over to the next column, under phosphor bronze, where the speeds are safe up to 1200 ft. per min. If a pair of gears are required to run at, say, 1600 ft. per min. (considered unsafe for bronze gears), it would be better to go to the next column under machine steel. And in the same way, if the speeds are so high as to go beyond 1800 ft. per min., only heat-treated hardened gears such as chrome-nickel gears should be used to be safe. The table will show at a glance which material the gears should be made from when the speed in ft. per min. is known.

Value S in columns 2, 3, 4, and 5 should never be exceeded, and the figures given here are maximum.

In experiments on a pair of cast-iron miter gears, 20 teeth, 2 D.P., 10 in. P.D., running at 220 r.p.m., giving a velocity V in ft. per min. of 576 and a tooth load of 1000 lb., the gears began to show signs of abrasion on the engaging teeth in but a week's run. The wear was quite noticeable, and it was quite evident they were doomed to destruction. After two month's service under working conditions they had to be replaced, the teeth having worn so thin that it was necessary to make a replacement. This has been done with machine-steel gears, and they have all appearances of holding up indefinitely.

Value S in Table 1 is to be used in the regular Lewis formula for safe tooth loads and horsepowers in place of figures given in handbooks for value S. Figures given in the handbooks for S are out of proportion. (Edward J. Rantsch, Hollis, L. I., N. Y.)

Substitutes for High-Speed Steels

MS-2 Have there been any recent developments in cutting metals to replace the commonly used high-speed steels?

(*a*) There have been recent developments, both in high-speed steel and in substitutions for high-speed steel. Of late, the tendency has been to increase the alloy content of high speed particularly in the way of additions of cobalt in amounts greater than formerly used in the regular cobalt high-speed steels. Principally, the development of a substitute is in the use of tungsten carbide, with which a great many persons have been experimenting in this country and abroad for a number of years. The production of tungsten carbide is a matter of at least 30 years standing as it was made by Moissan in the middle 90's. Its hardness is just short of the diamond and it is extremely brittle, and it is therefore necessary to powder it and mix it with a bonding material in order to give it sufficient strength and toughness for use.

In this connection, the reader is referred to a paper recently presented at the A.S.S.T. Convention in Philadelphia by Dr. S. L. Hoyt of the General Electric Company, entitled "Tungsten Carbide—A New Material." (John Mathews, Vice-President, Crucible Steel Co. of America, New York, N. Y.)

(*b*) The Krupp Company in Germany not only has developed a similar material which they call "Widia," but have induced machine-tool makers to start the manufacture of lathes and milling machines especially adapted to make it possible to utilize fully the cutting properties of the new alloys. (Editor.)

Power

Power-Plant Depreciation

P-1 What is the first cost per horsepower and the proper depreciation and obsolescence to allow on modern steam plants in sixes of 5000, 10,000, and 25,000 kw., particularly very modern types with air preheaters and the like?

It is strongly recommended that the inquirer obtain a copy of Publication No. 24-76 issued in September, 1924, by the National Electric Light Association, Graybar Building, New York. (Price 25 cents.) This publication is a serial report prepared by the Prime Movers Committee under the title "Design and Maintenance of a 7500-Kw. Central Station Plant." The report contains an itemized estimate of investment costs, and itemized operating costs for three different load factors.

Specific inquiry is made concerning depreciation and obsolescence, particularly ,when air preheaters, etc. are involved. The writer considers that depreciation, or more properly obsolescence, is determined by economic conditions, and that it is practically unaffected by the specific type of equipment used. Thus the whole plant should be abandoned when the demand has so outgrown the plant that a new one becomes justified, or when mechanical developments render available a new type of plant or equipment, the production costs for which are sufficiently low to make a new plant economically expedient. To forecast obsolescence it is necessary to make a judicious guess as to the economic life of the plant. If it is assumed to be 20 years, the annual obsolescence will be 3.36 per cent (sinking-fund basis with 4 per cent interest compounded annually). For 15 and 25 years, obsolescence is 5.00 and 2.40 per cent, respectively. If the value of money is 7 per cent (interest), and taxes, insurance, and miscellaneous total 2 per cent, then the aggregate annual fixed charges will range between 14.0 and 11.4 per cent as the economic life ranges from 15 to 25 years, respectively.

But throughout its economic life, if the plant is to be reliable, each piece of equipment must be properly maintained. Eroded turbine blades and corroded boiler tubes or air preheater plates must be replaced as these difficulties occur, and the writer considers these to be maintenance charges. Again a judicious guess is necessary, preferably based upon an accumulation of data.

The Prime Movers Report uses 15 per cent for fixed charges and an assumed gross maintenance dependent upon load factor.

By using the construction-cost data referred to and the writer's discussion of fixed charges as a guide, the inquirer should be able to analyze his problem satisfactorily. (F. M. Van Deventer, M. E. Constr. Dept., H. L. Doherty & Co., New York, N. Y.)

Sodium Aluminate for Boiler-Feedwater Treatment

P-2 With what success has sodium aluminate been used to treat locomotive-boiler feedwater?

Sodium aluminate has been on the market for a great many years but it is only recently that the product has been satisfactory for general boiler-feedwater uses. The material is now used extensively as a coagulant in conjunction with alum and also in lime-soda softening. It has found wide application for the internal treatment of boiler waters both in stationary and railroad practice. When the product is properly prepared and used in the right way the chemical has proved exceptionally effective in the prevention of scale, reduction in priming and foaming tendencies of the concentrated boiler waters, and in the prevention of after precipitation in chemically softened water.

The successful application of this method of treatment depends on intelligent control and the proper processing of the material. It is suggested to those who anticipate using this material that they give careful consideration to the quality of the material purchased, since there is considerable difference in the various grades offered by different manufacturers. (S. T. Powell, Chairman, Boiler Feedwater Studies Committee.)

Boiler Corrosion

P-3 On boilers without economizers fed through open feedwater heaters operating at 210 deg. fahr. or thereabouts, has there ever been evidence of corrosion due to lack of deaerators? If so, under what conditions and circumstances did it occur?

The writer has never found any evidence of corrosion due to lack of deaeration or the presence of oxygen in boilers where the feedwater was heated in an open heater to about 210 deg., with the heater of ample size and well vented. We have found corrosion in boiler shells where closed heaters were used with water containing gas and air. (M. K. Bryan, Chas. T. Main, Inc., Engineers, Boston, Mass.)

Questions to Which Answers Are Solicited

Catalyzers for Use With Coal

F-13 With what success has a mineral-salts catalyzer been used with No. 1 buckwheat coal? What has been the effect on the CO_2, and has there been any material effect on the boiler tubes?

Conveyors in Paper Mills

WI-2 What types of conveyors are used in paper mills, and what is the general practice in moving materials and finished product around the plant?

Correspondence

Stresses and Reactions in Expansion Pipe Bends

TO THE EDITOR:

Mr. A. M. Wahl, in the closure of his paper "Stresses and Reactions in Expansion Pipe Bends,"[1] cannot understand why I obtained a discrepancy of 30 per cent when I applied Mr. Wahl's formula to the tests of Professor Hovgaard. The explanation is that the wording of one of Professor Hovgaard's results is, according to a private communication from him, misleading. On page 100 of his paper the reduction of the pipe diameter is given instead of the deflection in the radius, in other words the numerical value 0.048 in. $= 2y_B$ and not y_B. Accordingly when I applied Mr. Wahl's formula to this result I found a discrepancy of 50 per cent. For the other pipe Professor Hovgaard gives a discrepancy of 9 per cent, the average of the two being about 30 per cent.

ANDREW A. BATO.[2]

East Orange, N. J.

TO THE EDITOR:

Mr. Bato claims that a discrepancy of 50 per cent is obtained when Formula [13] of my paper on "Stresses and Reactions in Expansion Pipe Bends" is applied to the test of the Boston Navy Yard pipe bend by Professor Hovgaard. In order to clear up this discrepancy I have calculated the flattening of this bend by this formula and found a value equal to 0.0476 in. Comparing this with the value 0.048 in. obtained experimentally by Professor Hovgaard, we see there is very good agreement indeed. The details of the calculations are as follows:

For this bend, using the notation of my paper,

$R = 13.75$ in.

(at the point G of Fig. 10 of Professor Hovgaard's paper where the flattening was measured)

$r = 2.3$ in.
$t = 0.1175$ in.
$\lambda = tR/r^2 = 0.306$
$K = 0.189$ (from Formula [3] of my paper)

The bending moment M at point G of the Boston Navy Yard bend at a load of 700 lb. was 700×25.6 in. $= 17{,}900$ in-lb.

$E = 29 \times 10^6$ lb. per sq. in.
$I = 4.524$ in.[4] (p. 99, Professor Hovgaard's paper).

Substituting these values in Equation [13] of my paper we get the decrease in the radius of the cross-section:

$$\delta = \frac{MRr}{KEI}\left(\frac{6}{5 + 6\lambda^2}\right)$$

$$= \frac{17{,}900 \times 13.75 \times 2.3}{0.189 \times 30 \times 10^6 \times 4.52}\left(\frac{6}{5 + 6\,(0.306)^2}\right) = 0.0238 \text{ in.}$$

The total change in diameter is thus 2δ or 0.0476 in., which compares with the value 0.048 in. found experimentally. It is therefore my opinion that Mr. Bato mistook Formula [13] to apply to the change in the pipe diameter, whereas, as stated on p. 250 of the Transactions, vol. 50, no. 15, this formula applies only to the change in radius of pipe cross-section. This would explain the 50 per cent discrepancy obtained by him.

A. M. WAHL.[3]

East Pittsburgh, Pa.

Wages of Engineers

TO THE EDITOR:

Mr. Thomas H. Normile, in his letter in the September issue of MECHANICAL ENGINEERING, answers my previous request for facts by presenting a most interesting chart that is a decided contribution to the sparse data on the subject. As such I welcome it and thank Mr. Normile, although it hardly bears on my thesis, which was the necessity for the engineer to get into business for himself, preferably as part owner of an enterprise utilizing engineering skill. Mr. Normile's chart compares only lawyers with engineers in the employ of New York City, and fails to mention other professional employees. It appears to me merely to point out the already well-recognized fact that lawyers still control politics and make out better than others in rewards from political bodies.

TABLE 1 PROFESSIONAL INCOMES IN NEW YORK STATE

	All returns		Incomes of $5000 and more	
Professions	Number	Average total income, dollars	Number	Average income, dollars
Classified as working for others				
Accountants	10,083	3092	920	7,696
Architects	2,167	2709	113	9,628
Artists	4,139	3289	487	8,002
Authors and literary	4,128	3777	685	9,572
Clergyman	2,910	2887	264	8,462
Engineering (professions)	13,397	3312	1383	9,123
Lawyers	3,459	3662	571	10,632
Medical	6,120	2770	451	9,524
Public service	68,800	2191	1790	8,267
Theatrical and entertainers	4,675	3591	594	11,755
Teachers	5,167	2567	429	8,181
All other professions	4,735	1788	142	8,354
Classified as working for themselves				
Medical	13,910	4746	3634	9,858
Legal	8,583	8623	3818	15,606
Engineers and architects	1,517	8698	688	15,498
Professions for which degrees are conferred	3,037	3691	456	8,570
All other professional services	5,075	4475	990	12,088

A sample of statistics which seem to bear out my contention is shown in Table 1. It will be noted that under the classification of those persons who are "working for themselves," engineers and architects actually lead with an income of $8698, but the close follow-up of the lawyer with $8623 indicates once more that it is the factor of employer vs. employee, rather than profession vs. profession, that determines income. This is confirmed by the large spread between the figures given and the incomes of those who work for others: to wit, lawyers $3662, engineers $3312. In spite of organized professional obstructions among the medical men so strongly advocated by Mr. Normile, they can show in this class only $2770, while the entirely unorganized authors beat all with $3777! So much for the effectiveness of organized effort.

Mr. Normile's chart is better answered, however, by Figs. 1, 2, and 3, compiled from the data selected from pages 482 to 515 of the annual report of the State Tax Commission (New York State, 1922). These curves hardly need any comment; they seem to substantiate my thesis. The difference between incomes of those professional people who work for others is slight; there are greater differences between those working for themselves,

[1] Transactions, vol. 50, no. 15, May-August, 1928, Paper No. FSP-50-49.
[2] Consulting Engineer, East Orange, N. J. Mem. A.S.M.E.

[3] Mechanics Section, Research Department, Westinghouse Elec. & Mfg. Co.

but no comparison between those in this class and those working for others—the former is far ahead of the latter. One other group implies a degree of ownership in the business, or at the least, a degree of personality. That is the class called "corporation officials," to which class engineers find ready access. It will be noted that they lead in incomes. (Fig. 3, curve *J*.)

It should also be noted that regulation of the profession among lawyers and physicians, which regulation it is proposed by Mr. Normile that we engineers should follow, has not insured higher incomes. The curves (*A* and *D*) of those lawyers and engineers who work for themselves almost coincide; there is small difference between these professions as they work for others (curve *B* and *E*). Curve *E* showing a well-regulated profession (lawyers who work for others) is not superior to authors who work for others (curve *H*), a notoriously overworked "hack" profession. The regulation of the medical profession places them well below us when working for others, and when working for themselves (curve *F*) they make a very poor showing—quite a negative argument *re* professional regulation.

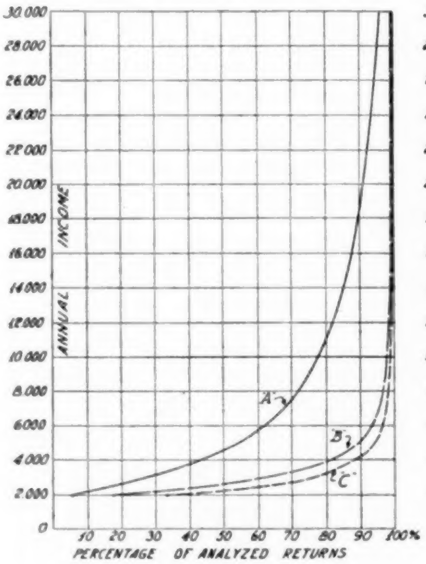

Fig. 1

Curve *A*—Engineers and architects working for themselves.
Curve *B*—Engineers working for others.
Curve *C*—Architects working for others.

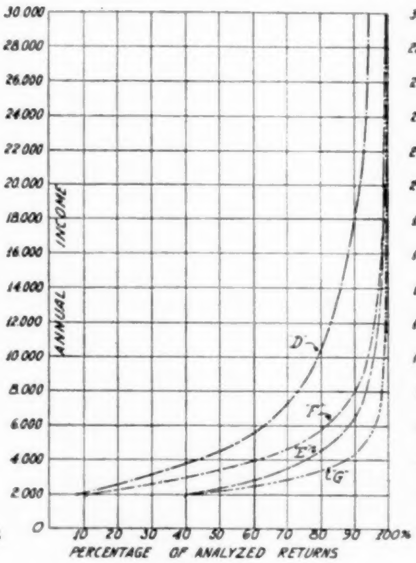

Fig. 2

Curve *D*—Lawyers working for themselves.
Curve *E*—Lawyers working for others.
Curve *F*—Medical profession—those working for themselves.
Curve *G*—Medical profession—those working for others.

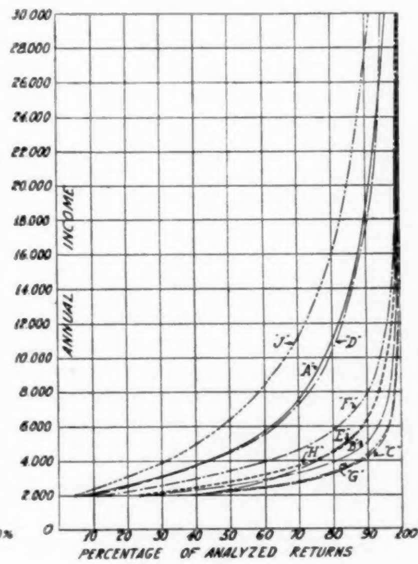

Fig. 3

Curves *A*, *B*, and *C* of Fig. 1
Curves *D*, *E*, *F*, and *G* of Fig. 2.
Curve *H*—Authors and literary profession.
Curve *J*—Corporation officials.

Upon further reflection I wonder if the difficulty may not be that Mr. Normile and I are talking from two irreconcilable positions: the one that of the engineer in business, Mr. Normile's that of the engineer in public service. The features that attract men to public service—or for that matter, those attractions that produce the college professor, or the pure research scientist, or what not—are of a nature that lies outside of this discussion, and are not of themselves determinants between different classes of professional men. The more engineers who get into business for themselves, the fewer there will remain for competition for the few jobs in public service.

Referring once more to my editorial and Mr. Normile's letter, I still maintain that engineering skill of the kind and degree necessary to do the job in hand is an essential part of the personality to be developed. Hence I see no reason why the same degree of engineering skill clothed with a personality that could obtain enough public backing to go into business cannot be as safely trusted with the design of a dam as that same skill without the personality. Why should the possession of engineering skill imply the lack of other pleasing or necessary qualities of a man's character? Since when has my definition of personality—or any other definition—become synonymous with hypocrisy?

In short, I remain firm in the belief that the elements of success include a large element of personality (not hypocrisy), and I believe the proper place for an engineer to make money under present conditions is in business for himself, preferably as owner or part owner of an enterprise requiring engineering skill; that such ownership can be obtained in many ways, and not least among them is the development of his skill and character to the point that others are willing to entrust him with leadership in the business. When he has accomplished this, which involves the full development of his personality, then the absence of other capital to engage in business is not serious.

Crosby Field.[4]

Brooklyn, N. Y.

Corrections

In the editorial entitled "Impartial Expert Evidence" on page 806 of the October issue of Mechanical Engineering, the second sentence should have read: "A Committee of the New Jersey (*not* New York) State Bar Association has prepared a bill for submission to the legislature which has as its object the correction of abuses in giving expert evidence where the bias and prejudice of experts in favor of their employer is plainly manifested."

* * *

In the November issue it was announced as a footnote to Mr. Steczynski's paper on "Preferred Numbers for American Practice" that a paper on the application of preferred numbers in Germany by Prof. Dr. von Dobbeler would appear in this issue. It has not been possible to do this, but the paper will appear in as early an issue as possible.

[4] Vice-President, Brillo Manufacturing Co. Mem. A.S.M.E.

MECHANICAL ENGINEERING

A Monthly Journal Containing a Review of Progress and Attainments in Mechanical Engineering and Related Fields, The Engineering Index (of current engineering literature), together with a Summary of the Activities, Papers, and Proceedings of

The American Society of Mechanical Engineers

29 West 39th Street, New York

A Seed of Constant Reconstruction

IN A NEW book written as a challenge to those who see our scientific age riding to its destruction, one writer emphatically states that machine civilization "is highly dynamic, containing within itself the seeds of constant reconstructions." The extreme youth of the mechanical age has brought some excesses which we must recognize, but the answer is not less mechanization but more, and that in coordination with human values.

On March 4, 1929, Herbert Hoover joins the ranks of the elected leaders of the world. As one who gained his experience in the profession "whose passion it is to build and construct," he embodies the "seed of constant reconstruction." He sees the needs of a rapidly advancing science and the cooperative solution of complex industrial problems so that the fullest opportunities for the individual will prevail. May his strength be sufficient to the tasks before him, and may his administration bring to fruition many contributions to the advancement of our mechanical civilization which has already brought great happiness to the world's peoples.

The Mechanical Engineers' University

THIS issue will reach most of the members just as the great Annual Meeting of the Society starts on December 3. To those who cannot be present at what promises to be the most important gathering in Society annals, we can only express deep regret that the inspirations and stimuli that come from such a gathering cannot be adequately conveyed to each of the 19,000 members. In the early life of the Society the Annual Meeting was the great gathering place of those who were ambitious to gain knowledge from the experience of their associates. Today we have a large membership that extends from coast to coast, a splendid scheme of divisional and sectional meetings, and a correspondingly complete publication procedure which brings the Transactions to the membership for study and record. The great annual gathering still has its place, however, for it assembles all the schools of mechanical engineering thought in one place for five days and permits that interchange of views between branches which is fundamental to consistent development. With a program of excellence, the opportunity for forming strong professional fellowships, and related activities such as the Power Show, the Annual Meeting is a great post-graduate school in mechanical engineering which provides a liberal education to those who attend.

Coal, a Raw Material

THE splendid conference on bituminous coal at Pittsburgh during the week of November 19 was dedicated to the advancement of the conception of coal as a complex combination of valuable hydrocarbons that may provide the raw material for many new industries. In the appreciation of this conception and in the abandonment of the idea that coal is merely a high-grade rock that may be mined and marketed as so much miscellaneous boiler fodder, lies the opportunity for a revitalization of the coal industry.

The problems are of world-wide concern. Each European nation lacking boundless resources of coal and oil has given intensive attention to research into its own needs. The range of investigation throughout the world has been extensive, but while it has continued for many years, a clear idea of the possibilities has not yet been evolved.

In bringing together for a second time the research workers of the world in the problems of bituminous coal, Carnegie Institute has made a signal contribution to science and engineering, to the coal industry, and to the great coal-using industries. The presence of large numbers of those intimately connected with coal producing and coal using in this country for the purpose of participating in the splendid program of valuable addresses and papers offered, is an indication of the probable immediate effect of the conference. Second only in importance to this exhibition of interest is the fact that an enormous amount of space was devoted to the conference in the daily press of the country, a most significant indication that the layman is in the mood to know something about our coal problem and its solution.

A Stimulating Steel Meeting

SHEET rolling, European steel-mill operations, and the presentation of a new scheme of caring for obsolescence attracted the attention of the splendid gathering of steel-mill engineers and executives at the National Meeting of the Iron and Steel Division of the A.S.M.E. in Chicago on November 14 and 15.

The sheet-rolling paper by Leon Cammen stressed the backward state of the art and discussed the economic engineering and merchandising problems of the new continuous-sheet processes. It drew forth a volume of written discussion which in the main agreed with the author that changes are inevitable and that output must be concentrated to meet present specifications and price levels, but disagreed as to the methods of future development and combated with vigor the statement that the sheet-rolling industry was backward.

That the present status of the steel industry of Continental Europe is decidedly unfavorable was the opinion of Professor Trinks of Carnegie Institute of Technology, who traced the complicated relationships of the industry with labor and govern-

ment and outlined the marketing difficulties, none of which can be simplified or solved in the near future.

Insurance policies against obsolescence, with charges levied against the cost of the product, was the novel scheme advanced by Harold V. Coes as a possible future means to permit industry to adopt new and modern inventions and place them at work without new financing. This plan of spreading the risk due to obsolescence was, however, to be based on thorough analysis of the history and trend of industrial processes.

One paper worthy of special mention unfortunately drew out little discussion. This was a complete analysis of the fuel, power, and other services in steel plants, which was presented by Messrs. Willcox and Fox of Chicago. The authors detailed the entire process of selecting the complete equipment of a steel plant, which should be of incalculable value to engineers in steel-plant design.

The remainder of the program dealt with bearings, lubrication, the manufacture of nickel steel plate, and hot-blast cupolas.

A 200-Inch Telescope

ANNOUNCEMENT of the gift by the International Education Board to the California Institute of Technology which provides for the construction of an astrophysical observatory equipped with a 200-inch reflecting telescope will be received with interest by all engineers. The new telescope, four times as large in light-collecting power as the present 100-inch instrument on Mt. Wilson, together with its auxiliary apparatus, will be used to supplement the older observatory and will be employed, among other things, for research into many problems which bear directly on the constitution of matter. When it is recalled that many elements of engineering importance have been discovered by the use of astrophysical apparatus, the importance to practical engineering problems of the discoveries which may be made possible with the newer equipment will be evident to engineers. We have many times in these columns drawn attention to the fact that science and engineering are drawing closer and closer together and that the hypotheses and discoveries of today become the essential features of tomorrow's industries. We look forward, therefore, with confidence that these new facilities of science will eventually bring about important advances in engineering.

Aside from these more remote interests, engineers have an immediate part in the design and construction of the apparatus itself, which presents problems that require skill and judgment. The casting and grinding of the 200-inch reflector of fused silica and its safe transportation to the top of some lofty mountain involve some very practical considerations, to take but one very obvious illustration. Engineers will look forward to a report telling how these problems were solved.

Members of the Society will recall with affection their Past-President John A. Brashear and his numerous contributions to the manufacture of lenses and specula for astronomical instruments, and their still living Past-Presidents Ambrose Swasey and Worcester Warner who, under the name of Warner and Swasey, have constructed many of the world's important observatories. It is gratifying to note that Mr. Swasey has consented to lend his assistance and that of his organization to the present undertaking.

Engineering Honesty

A MAN endowed with true greatness may naturally be expected to handle important matters in a big way. The number of those experienced in the operation of lighter-than-air craft is unfortunately small because of the enormous cost and uncertain status of present-day dirigibles, but the work requires high engineering talent and unusual judgment in those few into whose hands the great ships of the air are entrusted. That Dr. Hugo Eckener is in the forefront rank of dirigible experts has been long recognized, and the recent flight of the *Graf Zeppelin* from Germany to Lakehurst and back has still further established his eminence in this field.

In many ways the flight to Germany was not only a spectacular but a truly noteworthy performance. Flying through very inclement and at times dangerous weather, the Zeppelin not only was safely brought to its destination but established a remarkable record for the time of flight. It would have been very easy for Dr. Eckener under these conditions to make the welkin ring with claims that the dirigible had solved the problem of high-speed transoceanic transportation and threatened to relegate the ocean greyhounds to the limbo of forgotten curiosities. The temptation to do so was great, and a lesser man might have fallen victim, at least to the extent of committing the sin of suppressing the truth if not proclaiming falsehoods. That Dr. Eckener did not do so testifies to that quality of sturdy honesty in his make-up, which in the past has distinguished the majority of great engineers.

According to the Associated Press, Dr. Eckener said that the *Graf Zeppelin* and its motors are proof against any weather. This may be accepted as established by the fact that on both trips the dirigible encountered considerably nasty weather, including fog as well as powerful and irregular head and following winds. He might have added that it was largely because of his apparent expert handling that the *Graf Zeppelin* was brought safely to its destination, but of course if dirigibles come to be used regularly, a class of expert navigators will be developed. However, the important part of Dr. Eckener's statement is that "We must have faster and stronger airships, if we want to carry on a regular passenger service.... We have not conquered the ocean yet." It is well to realize how far from actual success one is at any time. An over-confident engineer fools no one but himself, and engineers will certainly appreciate the frankness of Dr. Eckener's statement, because therein lies the greatest promise of possible future success.

Pig Iron Without Coke

EVERY one connected with the iron industry knows of the many attempts to produce iron without coke or else to produce steel directly from the ore. The two processes are by no means the same. In the first case the purpose is to produce a material which will not differ substantially from pig iron; in the second, the aim is to manufacture directly from the ore a low-carbon material. The present discussion will deal with the former only.

As a matter of fact, not only are quite substantial amounts of pig iron produced without coke today, but they appear to be actually of a higher quality than iron made with coke. This refers, of course, to charcoal iron, such as is made in small quantities in this country and in much larger quantities in the Ural Mountains of Russia and in Sweden. When, however, metallurgists speak about making iron without coke they do not mean charcoal iron but iron in tonnages approaching those required by the larger industrial countries.

There have been numerous attempts to achieve this aim. The reason back of it all is primarily economic. Even where coking coals are available their supply is not large, and because of their natural scarcity the price is comparatively high. In many other countries coking coal is not available at all, as, for example, France and Brazil. The ability to use non-coking coals would have the effect of reducing the general cost of iron manufacture,

making it possible in the countries referred to and incidentally throwing open a very large and attractive market to some other fuel.

Substantially, the reaction in the blast furnace is a double one. In the first place coal is oxidized to carbon monoxide, and in the next stage this carbon monoxide is burned to carbon dioxide. By far the larger number of heat units in the furnace is developed in the second reaction. It has been claimed for a long time that there are many advantages in carrying out the "carbon to carbon monoxide" reaction outside of the blast furnace proper. In several cases iron has been actually made in that way, but it is only quite recently that the mechanism of what might be called the carbon monoxide blast furnace has been mastered sufficiently to indicate that we are on the eve of possibly a revolution in the art of iron making.

This will not probably mean that every kind of bituminous coal will be usable for blast-furnace operation, as limitations of sulphur and phosphorus content will likely be operative. On the other hand, news is coming from Brazilian metallurgical authorities to the effect that, especially in certain tropical countries, it will not be necessary even to have bituminous coal to maintain the iron industry, as other fuels may become usable for this purpose.

New Cutting Metals and Old Machine Tools

THE invention of high-speed steel by Taylor and White not only made it possible to increase enormously the rates of metal cutting, but spelled the doom of old machine tools. Faster and heavier cuts meant more rigid construction of the tools, and gradually led to a complete change in their design. This is an old story, but it acquires a very modern significance by the introduction of such cutting materials as Carboloy in the United States and Widia in Germany, both of which are made up of tungsten carbide embedded in a matrix of cobalt. These materials, if reports of tests recently published by men and companies of high standing are to be trusted, are substantially as far ahead of the present-day high-speed steels as were the latter in comparison with the carbon tool steel of pre-Taylor days, and this means new designs of machine tools to meet newly created conditions. As a matter of fact, the Schiess-Defries Machine Tool Co. of Düsseldorf, Germany, has already built a number of machines specially designed for the use of the new cutting metal, and the results obtained appear to be little short of startling. For example, on work $2^1/_4$ in. in diameter a cutting speed of 330 ft. per min. has been achieved, corresponding to a rotary speed of 560 r.p.m.

Two attitudes of mind exist with regard to machine tools. One is to conserve the initial investment as much as possible, and to use the machine tool as long as it turns out work. The other is to get out of the tool all that it can do in the shortest possible time—consistent with reasonable loading of the tool, of course—and then replace it by a new tool. Neither of these two plans has a monopoly of useful application. The adoption of one or the other depends upon a number of factors, and primarily on the amount of work that the tool can be called upon to do. The development of the new cutting metals may, however, introduce an important new factor in that, in addition to what might be called natural obsolescence, the machine tool may become obsolete overnight through the fact that suddenly it becomes unable to compete with newer tools specially designed for the use of the new high-speed cutting alloys.

This will be of very great advantage to machine-tool builders, because it will greatly increase their market. It will, however, also be simultaneously of great advantage to machine-tool users, because if the new metals can fulfil the expectations which they raise, the improved productivity of the tools and the lower cost of operation brought about will rapidly pay for the residual value of the prematurely discarded tools, and will in addition greatly speed up production.

The redesigning of machine tools to make them capable of using the new cutting materials to best advantage will require considerable research, some of it of a fundamental character. The question now is whether this research—as was frequently the case in the past—should be carried out in a haphazard manner, or systematically and thoroughly? There can be no question as to the ability of systematized research to produce better results, and the cost of such research is not likely to be prohibitive. The only problem is to present this important undertaking to the tool-building and tool-using community in such a manner as to secure their willingness to cooperate wholeheartedly.

Printing Engineers Discuss Problems

MANY new facts and practices were brought out at the First National Meeting of the Printing Industries Division at Rochester, N. Y., on November 8 and 9. An interesting demonstration was given of the Visagraph, a machine that enables the blind to read any book direct from the printed page without the former necessity of having it reprinted in Braille letters. The open book is placed in the machine, and five small parallel beams of light are guided by the blind reader horizontally along the line of letters, these being reflected on a selenium cell. This, having the quality of passing electric current when light is thrown upon it, selectively sends these tiny currents to a relay, from where the intensified current acts on five plungers or points of a little metal box held in the hand of the reader. These points by rising and falling under the tip of the finger give to the blind person an indication of the shape of the letters. The Visagraph is the invention of Robert E. Naumberg, of Winchester, Mass., and the demonstrations of reading from the pages of a book were given by Toivo Laminan, a graduate of the Perkins Institute for the Blind.

Alexander Dow, President of the Society and head of the Detroit Edison Company, dropped in on the meetings, saying that he came for the purpose of seeing how a highly specialized division worked out its problems. Asked to tell of the time when he was Henry Ford's "boss," he recounted some of their early experiments together, particularly the rebuilding of an engine with a steel lining for the cylinder. This was an innovation at that time, but it was a good engine when he and Mr. Ford got through with it. This engine is now among the exhibits in the Ford museum of transportation and electric energy.

A. J. Newton, of the Eastman Company, said that the demand for color in the graphic arts as reproduced by means of photography will continue to increase. The chief novelty that the speaker described was the new Jean Berte process of printing in water colors.

Taylor W. Anstead, of the Ault & Wiborg Company, of Cincinnati, discussed the confusion existing today in the colored-ink field and the need of standardization in tints and their nomenclature.

William C. Glass, vice-president of the United Printing Machinery Company, of New York, told of the growth of bronzing and the methods of applying it. Public demand has increased the use of gold and its visual substitutes as a decorative medium until today it appears on almost every commodity offered in package form. Machinery has been developed to handle the increasing volume and the greater speed required. The vacuum bronzer is the first important development in twenty-five years, giving tremendously increased speed over the former hand applications.

Dexter S. Kimball, dean of engineering at Cornell University, spoke on the progress of engineering and declared that its possibilities were almost unlimited. He told his audience that it would be possible for every man, woman, and child in the country to go riding in automobiles at one time, there being 23 million auto-propelled vehicles in this country. The new Hudson River bridge was described as the biggest thing yet undertaken by human hands, and he declared that engineering had advanced the fundamentals of bridge construction to the point where there was no great problem involved should a contemplated bridge over the Golden Gate require an even greater span and cables of 40 in. diameter.

National Textile Meeting at Greenville, S. C.

THAT the South is making pronounced progress in engineering and the use of engineering methods, was clearly evident at the Second National Meeting of the A.S.M.E. Textile Division held in Greenville, South Carolina, on October 17 under the auspices of the Society's local section. Probably the keynote of the meeting was expressed by J. E. Sirrine, a widely known mill engineer of Greenville, who, in a speech at the dinner in the evening, stressed his disapproval of securing industrial expansion on the basis of low wages. He commended the country on not growing rich on low wages nor on a policy of thrift which, if carried very far, would bankrupt the nation. Instead, he expressed the desire that progress be not stated in terms of improvements taking place in machinery, but in the increased output per person employed. He concluded that he did not know to what extent wages could be increased in the textile industry, but that the idea should be tried in order to see if the general prosperity could not be raised by increasing the output per person.

James W. Cox, Chairman of the Division, who preceded Mr. Sirrine as speaker, called attention to the fact that although conditions in the industry had changed from a sellers' to a buyers' market, there were a number of mills making substantial and steady profits, and that these mills were making progress due to a knowledge of what to do and how to control their processes. He pointed out that an engineer is trained to observe his facts and act accordingly, and that when this method is followed, success almost inevitably results.

President Alex Dow in a witty address told of methods used in some of our new industries that have become such outstanding successes in the past decade.

Further evidence that the South is making rapid progress in engineering methods was furnished to the visiting members through the opportunity to inspect a plant constructed within the last five years at Lyman, near Greenville. This plant of the Pacific Mills is a very modern and well-controlled establishment and testifies to the fact that the South can expand its textile industry and hold this expansion by adopting modern engineering methods and efficiency. A feature of added interest in the inspection of the plant was the model village that had been built for employees, which showed foresight on the part of the management superior to that in other parts of the country in looking out for the welfare of the employees.

The A.S.M.E. and the Railway Mechanical Engineer

THREE years ago it appeared to be the consensus of opinion of members of the A.S.M.E. interested in railway mechanical engineering, that the Railroad Division of the Society should be disbanded. However, it was decided at that time to continue the Division and, if possible, develop a distinct field in which it could serve the railroad and railway-supply industries.

It is interesting to note that in the report of the discussion at the two meetings, during which the Railroad Division was reorganized, no mention was made of service by the Division to the Society, nor of the fact that mechanical engineers in other industries were concerned with developments in the railroad industry. After several months, however, this important factor was considered by the Railroad Division and eventually led to development of the professional-service idea, and the appointment of a Sub-Committee on Professional Service.

However, these developments did not solve the major problem of developing a distinct field of service in the industry and at the same time not competing or rendering duplicate service with 40 different official and semi-technical railway associations and clubs. The problem was further complicated by the development of a program of national meetings in which the Railroad Division was asked to take part.

In the meantime, the Sub-Committee on Professional Service submitted a report in which it was shown that the railroad and railway-supply industries were largely dependent on each other; but that the present scheme of operation of the various railway associations, both official and semi-technical, made little or no allowance for the existence of the railway-supply industry, nor did they recognize its importance in railway transportation. For various reasons, many of which are excellent, the mechanical engineer in the railway-supply industry can take no part in the programs presented at technical sessions of the majority of railway associations, unless by special invitation. As a result of these findings, the Executive Committee was able to arrive at a near solution of its original problem: namely, to plan railway technical meetings at which the mechanical engineer in both industries can present papers and discuss their problems on an equal footing; these papers to be of as high a quality from a technical standpoint as can be obtained. The development of this policy finally resulted in the drafting and adoption of a statement of policies and objects which was published in the *A.S.M.E. News* for November 22 and also in the railway trade press.

In a practical working out of this plan the A.S.M.E. Standing Committee on Professional Divisions has recognized the various problems peculiar to the Railroad Division; especially that of holding a National Division meeting. There was prepared and mailed to railway mechanical engineers a list of papers, to be presented at the A.S.M.E. Annual Meeting of the Society, which were of definite interest to them although they were sponsored by other Divisions.

All papers having any possible bearing on railroad mechanical-department work were culled from the programs being presented by other Divisions, such as the Machine Shop Practice, the Oil and Gas Power, the Power, Fuels, Management, Materials Handling, etc. in the making up of this list. There is hardly a railway mechanical engineer in the country who is not concerned with the design, purchase, or use of machine tools, shop equipment, jigs and fixtures, power-plant equipment, fuel use and handling, or Diesel and gas engines, in addition to the work he has to carry on in connection with locomotives and rolling stock. From the standpoint of the railway mechanical engineer, the programs of the Railroad Division are only incidental to what he can obtain in the way of valuable technical information from the Society as a whole.

Undoubtedly the best services the Railroad Division will ever be able to render will be to represent the railway mechanical engineer in the numerous industrial and committee activities of the Society, afford a point of contact between the mechanical engineers from both the railroad and railway-supply industries, and look after the professional interests of the railway mechanical engineer.

Book Reviews and Library Notes

THE Library is a cooperative activity of the A.S.C.E., the A.I.M.E., the A.S.M.E. and the A.I.E.E. It is administered by the United Engineering Society as a public reference library of engineering and the allied sciences. It contains 150,000 volumes and pamphlets and receives currently most of the important periodicals in its field. It is housed in the Engineering Societies Building, 29 West 39th St., New York, N. Y. In order to place its resources at the disposal of those unable to visit it in person, the Library is prepared to furnish lists of references on engineering subjects, copies of translations of articles, and similar assistance. Charges sufficient to cover the cost of this work are made.

The Library maintains a collection of modern technical books which may be rented by members residing in North America. A rental of five cents a day, plus transportation, is charged. In asking for information, letters should be made as definite as possible, so that the investigator may understand clearly what is desired.

Principles of Labor Management

LABOR MANAGEMENT. By Gordon S. Watkins. A. W. Shaw Co., Chicago, 1928. Cloth, $5^1/_2 \times 8^1/_8$ in., 720 pp., illus., $5.

NO SINGLE key will unlock the door through which the solutions of the perplexing problems of employment relations will come. There is no panacea. But the principles and methods of procedure that intelligent understanding and practical experience have proved essential to the successful management of employees are available to all.

In the present work the author, who is professor of economics at the University of California, analyzes and interprets the principles of labor management, accompanying his presentation with numerous charts, forms, and graphs.

Whatever solutions are forthcoming, says Dr. Watkins, will be born of three important conditions: namely, (1) An intelligent understanding and scientific interpretation of the forces of evolution which have produced modern industrialism, (2) a scientific investigation of employment conditions, which appear to be the basic causes of working-class revolt; and (3) the application of workable methods of improving employment relations.

With this definite outline as a basis, the author proceeds to develop the subject-matter in a clear, logical manner. The general problems are stated and the basic assumptions of enlightened personnel administration set forth. Next he points out that if we would understand the intricate maladjustments in current industrial relations, we must have a clear perception of the economic antecedents strewn along the pathway of history.

Since personnel management is fundamentally a problem of understanding and directing human nature, it is imperative that the science of management shall recognize the elements of human nature. Therefore such topics as instincts, repression, acquisitiveness, gregariousness, sex and parental bent, fear, reason, etc. are discussed.

Following this is an outline of the general principles of administrative science, a description of the structure and functions of the personnel department, and a summary of the tasks and qualifications of the personnel manager. The necessity and wisdom of adapting the principles involved to the particular needs and problems of the individual establishment, are emphasized.

The author then takes up successively the sources of labor supply, the selection and placement of workers, and job analysis and specifications. He also deals with a number of important problems, including labor turnover; absenteeism; transfers and promotions; the plant paper; education and training of employees; wage systems and financial incentives; employee stock ownership; health maintenance; accidents and their prevention; working environment; housing; and personnel research.

Low-Temperature Carbonization

REVIEWED BY W. TRINKS[1]

THE TECHNOLOGY OF LOW-TEMPERATURE CARBONIZATION. By Frank M. Gentry. The Willams & Wilkins Co., Baltimore, Md., 1928. Cloth, 369 pp., 131 tables, 80 illus., $2.

LOW-TEMPERATURE carbonization, that is to say, coking at a temperature of 800 to 1000 deg. fahr., stands in the center of interest of fuel technology, if we may judge from the large number of papers offered at the recent international coal conference in Pittsburgh. For that reason Mr. Gentry's book should find a ready market.

As the title implies, the book lays great stress on technology. It deals in detail with the origin and the constitution of coal, with the theory of coking by external and internal heating, and also with thermochemistry. A chapter each is devoted to the products such as low-temperature coal gas, low-temperature coal tar, low-temperature coke, and nitrogenous and other by-products. These chapters are crowded with information on the physical and chemical properties of these products. Chapter VI treats of the various processes used for low-temperature carbonization and of the apparatus built for this purpose. This chapter is of particular interest to the mechanical engineer, but is, unfortunately, rather brief. The interesting and often ingenious details of the various types of carbonizing equipment are either omitted or insufficiently set forth both in the text and in the illustrations.

Chapter VII deals with some problems in design and operation, and more particularly with the problem of behavior and strength of materials for retorts. The concluding chapter goes into the financial side of low-temperature carbonization and investigates the conditions which must exist to make low-temperature carbonization a pecuniary success.

The main part of the book is followed by an astoundingly complete bibliography, which contains 413 up-to-date references. One cannot help being impressed with the care and diligence used by the author in searching for sources of information.

A perusal of the book leads to the conclusion that from the standpoint of chemical technology it is very complete, and furthermore that the book is less complete, and in places too sketchy and diagrammatic with regard to mechanical construction and furnace technology. But these few shortcomings make one appreciate the completeness of the other chapters all the more.

Gentry's work should be read by all those who have ambitions in the direction of low-temperature carbonization. It will open their eyes and keep them from going into a blind alley with the courage of ignorance.

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Books Received in the Library

Aide-Mémoire de L'Ingénieur Mécanicien. By J. Izart. Fifth edition. Dunod, Paris, 1928. Cloth, 5 × 8 in., 1263 pp., diagrams, tables, 95 fr.

A "pocket-book" of mechanical engineering, covering the same field as our well-known American works, but presenting French practice. The popularity of the book is shown by the frequency with which new editions have been required.

The present edition has been completely revised and reset. It contains many tables and formulas of value to engineers compelled to use metric measurements in machine design.

Die Berechnung von Fachwerkkranträgern mit Biegungsfestem Obergurt. By Günter Worch. R. Oldenbourg, Munich and Berlin, 1928. Paper, 7 × 10 in., 99 pp., diagrams, tables, 6.50 r.m.

Crane girders usually carry the rails directly upon their upper flanges and consequently are subject, in distinction from bridge girders, to bending stresses as well as the normal stresses. The calculation of these bending moments has hitherto been largely empirical, as no satisfactory exact method has existed.

This work presents an exact mathematical method, with a number of approximate methods of sufficient accuracy for practical purposes.

Die Bestimmung der Dauerfestigkeit der Knetbaren, Veredelbaren Leichtmetallegierungen. By Richard Wagner. (Bericht aus dem Institut für Mechanische Technologie und Materialkunde der Technischen Hochschule zu Berlin. Heft 1.) Julius Springer, Berlin, 1928. Paper, 6 × 9 in., 64 pp., illus., diagrams, tables, 6 r.m.

Describes a series of extensive tests of duralumin, elektron, lautal, and other light alloys, undertaken to determine their durability when exposed to repeated shock and vibration. The results are given in detail. The conclusions drawn will be of interest to designers of automobiles, aircraft, and other structures in which light alloys are used for structural members.

Blue Book of Facts of Marine Engineering. Edition 6. Ocean Publishing Co., New York, 1928. Cloth, 4 × 6 in., 135 pp., $3.

This little catechism contains questions and answers for engineers preparing for marine engineers' licenses of every grade.

Collected Works of J. Willard Gibbs. Longmans, Green & Co., New York, 1928; two volumes. Cloth, 6 × 9 in., portrait, tables, $6 (2 vols.).

Willard Gibbs is rated, by competent critics, as the greatest genius America has produced. His writings on thermodynamics, after long neglect, became the foundation of physical chemistry and established his position as one of the greatest physicists of all time.

As his writings have been out of print for some years, this new edition will be welcome to many physicists and chemists who wish to study his work at first hand. The collection is complete and includes the "Elementary principles in statistical mechanics," which was omitted in the former edition. A biographical sketch is also included.

Composition of Water. By J. R. Partington. G. Bell & Sons, London, 1928. (Classics of Scientific Method.) Paper, 5 × 7 in., 106 pp., illus., 1 s. 6 d.

The series to which this volume belongs aims to provide inexpensive reproductions of the great masterpieces of science in convenient form, with an account of the action and reactions of ideas which led up to the crucial experiments carried out and described by some great master.

In the volume on water Dr. Partington traces, chiefly in the words of the discoverers themselves, the experimental investigations that led to our present very exact knowledge of its composition. The researches of Cavendish, Lavoisier's work, Priestley's and Monge's work, and the investigations of later workers, down to recent times, are given.

Engineering Education; Essays for English. Selected and edited by Ray Palmer Baker. Second edition. John Wiley & Sons, New York, 1928. Cloth, 5 × 8 in., 233 pp., $2.

This collection of essays by noted engineers and scientists discusses the origins and types of engineering education and the place in engineering of the basic sciences. The book is intended primarily to provide students of engineering with good models of exposition, as part of their training in language. At the same time, the collection presents an ideal of education which will not only be of value to the student, but will also be of interest to all who are interested in the trend of present thought upon this topic.

Engines. By E. N. Da C. Andrade. Harcourt, Brace & Co., New York, 1928. Cloth, 6 × 8 in., 267 pp., illus., $3.

An interesting description of the chief kinds of engines by which the heat of burning fuel is turned into work, and of the scientific principles upon which their action depends. The book is based upon the author's Christmas Lectures at the Royal Institution of Great Britain, and hence is intended for readers without scientific knowledge. The author writes in interesting fashion, yet with scientific accuracy. The illustrations are unusually good.

Die Entropie-Diagramme der Verbrennungsmotoren. By P. Ostertag. Second edition. Julius Springer, Berlin, 1928. Paper, 6 × 9 in., 78 pp., diagrams, tables, 4.50 r.m.

The new edition of this work on the entropy diagrams of internal-combustion engines shows no fundamental changes, but the text has been revised and extended wherever necessary.

The basic conceptions on the behavior of gas mixtures and on combustion set forth in part one are used, in part two, to show how the behavior under various conditions of piston gas engines may be predetermined. The use of the gas entropy table in design is shown.

The third section discusses the design of gas turbines, with particular attention to the author's solution of this problem. The last section treats of some special problems.

Das Förderhöhenverhältnis der Kreiselpumpen für die Ideale und Wirkliche Flüssigkeit. By Wilhelm Schulz. (Forschungsarbeiten, heft 307.) V.D.I. Verlag, 1928. Paper, 9 × 11 in., 28 pp., diagrams, tables, 5 r.m.

In the first portion of this research the author investigates mathematically the flow of an ideal fluid in radial-discharge centrifugal pumps. The theoretical delivery and the conditions of delivery are calculated, numerical values are found for all possible combinations of number of blades, blade angle, and wheel proportions. These theoretical results are then compared with those obtained from a commercial pump in which various numbers of blades and various blade angles could be obtained. New data were obtained upon maximum efficiency, special throttle-head curves, favorable numbers of blades and deliveries, cavitation, and other properties. The actual and theoretical results are compared and methods of approximation studied critically.

Frachtverhältnisse und Frachtlage der Amerikanischen Eisenindustrie. By Fritz von Haniel. V.D.I. Verlag, Berlin, 1928. Paper, 6 × 8 in., 62 pp., diagrams, 4 r.m.

An economic study of transportation conditions in the American iron industry, based on first-hand study. Shipping facilities, tariffs, and other matters affecting freight rates for ore, coal, and finished products are discussed.

Kraftwerksbauten. By Siemens-Schuckertwerke. V.D.I. Verlag, Berlin, 1928. Bound, 9 × 12 in., 101 pp., illus., 5 r.m.

A collection of photographs and plans of modern steam-electric and hydroelectric power plants and transformer stations designed by the Siemens-Schuckert firm. Among them are the Fortuna II at Cologne, the Leverkusen, the Unterweser, the Shannon River, and the Tocopilla (Chile) plants.

Ludwig Franzius. By G. de Thierry. Verlag, Berlin, 1928. (Deutsches Museum Abhandlungen und Berichte.) Paper, 6 × 8 in., 33 pp., portrait, 1 r.m.

A brief biography and appreciation of the noted hydraulic engineer, based upon his autobiography. The brochure is one of a series issued by the Verein Deutscher Ingenieure and the Deutsches Museum, to illustrate the development of special branches of engineering through the labors of pioneer workers.

Luftschiff und Luftschiffahrt. By Marine-Baurat Engberding. Second edition. V.D.I. Verlag, 1928. Cloth, 6 × 8 in., 303 pp., illus., portraits, 7 r.m.

The construction and uses of the airship are presented with great skill and clearness in this book, which appears at an opportune time. Although the author gives attention to theoretical matters and structural problems which chiefly interest the engineer, he has been successful in presenting his material in such a way that the layman can understand it, so that the book will appeal to every one interested in aircraft. The book is profusely illustrated with photographs of Zeppelins. It is a valuable addition to the scanty literature on airships.

MacRae's Blue Book and Hendricks Commercial Register. vol. 19, 1928. MacRae's Blue Book Co., Chicago, 1928. Cloth, 9 × 11 in., 2632 pp., $10.

This consolidation of two well-known guides for buyers gives a convenient directory of about seventy thousand manufacturers, with their addresses, accompanied by an index to eighteen thousand different commercial products, with the names of their manufacturers. A third section enables the manufacturer of a product which is identified only by its trade name to be found. The book is of great use to buyers, particularly in mechanical lines.

Marine Diesel Oil Engines: A manual of marine oil-engine practice. By J. W. M. Sothern. Edition 3. Crosby Lockwood & Son, London, 1928. Cloth, 6 × 9 in., 949 pp., illus., plates, diagrams, 45 s.

A practical treatise on the principles, construction, and running of these engines. The work is designed as a textbook for engineers preparing for the British Board of Trade examinations for licenses, and treats the subject in great detail, although elementary in character. Much space is given to the details of the various makes of engines and to practical operation, repair, and maintenance.

Materialprüfung mit Röntgenstrahlen. By Richard Glocker. Julius Springer, Berlin, 1927. Cloth, 6 × 9 in., 377 pp., illus., tables, 31.50 r.m.

Intended as a general introductory text which will provide the beginner with enough knowledge to enable him to test materials in this way. The book opens with a brief account of the physical principles involved, but the greater part of the text is devoted to methods, which are illustrated by practical examples. A large number of useful tables are included and there is a useful bibliography.

Methoden der Praktischen Analysis. By Fr. A. Willers. Walter de Gruyter & Co., Berlin and Leipzig, 1928. Paper, 6 × 9 in., 344 pp., diagrams, tables, 20 r.m.

An introduction to the methods of practical analysis, including numerical, graphic, and instrumental methods. Especial attention is paid to the accuracy obtainable by the various methods. Numerous examples show the practical application of the methods.

Notes sur les Chaudières Employées dans les Installations de Chauffage Central. By L. Leleux. Dunod, Paris, 1928. Paper, 7 × 10 in., 108 pp., illus., diagrams, 20 fr.

This small book deals with boilers for heating buildings. The different types in use, their peculiarities, their management, their life and efficiency are studied in detail. Chapters are devoted to oil fuel and to gas-fired boilers. The work aims to place the selection of these boilers on an intelligent basis.

Oil Engine Power Plant Handbook. Edited by Julius Kuttner. Edition 4. National Trade Journals, Inc., New York, 1928. Cloth, 8 × 11 in., 288 pp., illus., $5.

The handbook contains a number of articles by various experts upon practical problems connected with oil- and Diesel-engine plants. Operation and maintenance, efficiency standards, electrical layouts for central stations, switchgear, piston-ring action, cooling-water systems, lubricants, exhaust-heat recovery and other live topics are discussed in a practical manner. In addition, the handbook contains descriptive data, prepared by the manufacturer, upon most of the oil engines produced and sold in this country.

Petroleum Register, 1928 Edition. Chilton Class Journal Co., Philadelphia, 1928. Cloth, 9 × 12 in., 606 pp., $10.

A convenient reference book for those engaged in the petroleum industry. Information is given about companies and associations engaged in producing, refining, and marketing oil. A buyer's guide lists manufacturers and dealers in equipment. Statistical tables show production, consumption, imports and exports, prices, etc. Sketch maps of producing areas are included. The book is international in scope.

Pneumatische Materialtransporte unter Besonderer Berücksichtigung der Späneabsauge-Anlagen. By Hans Rudolf Karg. R. Oldenbourg, Munich and Berlin, 1927. Paper, 6 × 9 in., 48 pp., diagrams, tables, 3 r.m.

This pamphlet is intended to be of practical use to the designer of installations for the pneumatic conveying of materials, especially the designer of sawdust conveyers. The author discusses the theoretical principles and provides the necessary data for determining the correct sizes of fans and pipes, together with advice on plans and a number of tables which facilitate the actual work.

Practical Industrial Furnace Design. By Matthew H. Mawhinney. John Wiley & Sons, New York, 1928. Cloth, 6 × 9 in., 318 pp., illus., diagrams, tables, $4.

A discussion of practical methods for solving the problems and difficulties most frequently met in selecting, designing, and operating industrial heating furnaces as distinguished from melting furnaces. The methods described have been used successfully by the author and are presented as a contribution to a subject that is not as yet thoroughly understood.

Among the topics are the selection of fuels, the application of the heat, methods of handling material, heat economy, the design of refractories and metal parts of furnaces, and temperature measurement and control.

Rational Mechanics. By Richard De Villamil. E. & F. N. Spon, London; Spon & Chamberlain, New York, 1928. Cloth, 6 × 9 in., 214 pp., 10s. 6d.

Colonel de Villamil discusses a number of fundamental difficulties in the theory of mechanics, as taught today. Many

theories now accepted are irrational, in his opinion, and for these he offers substitutes. His book is directed to engineers, rather than mathematicians, and is intended to stimulate independent thinking upon basic problems.

Résistance des Fonds Bombés. By E. Hoehn. Ch. Béranger, Paris, 1928. Paper, 6 × 9 in., 86 pp., diagrams, tables, 20 fr.

The increasing frequency of failures of the dished heads of cylindrical pressure vessels led the Swiss Society of Steam Boiler Proprietors to inaugurate investigations of the matter some years ago. In 1923 a report on the strength of electrically welded vessels was printed, which is now followed by this further contribution.

This pamphlet discusses theoretically the theoretical aspects of the strength of dished heads in pressure vessels, describes the tests made by the author, and gives the conclusions derived from the work.

The Slide Rule. By G. A. Gunn. E. & F. Spon, London, 1928. Cloth, 4 × 7 in., 40 pp., 2s.

This little work explains briefly and practically the use of the ordinary slide rule for multiplying and dividing, and for obtaining squares and square roots. It also gives directions for working out cubes and cube roots, and for trigonometrical calculations with the System Rietz slide rule.

Standards and Standardization. By Norman F. Harriman. McGraw-Hill Book Co., New York, 1928. Cloth, 6 × 9 in., 265 pp., illus., $3.

Considers such matters as the evolution of standards and their application in industry, the derivation of units, the purpose of standards, the advantages of standardization, methods of standardizing, and national standardizing bodies and laboratories. These and other topics are discussed in a broad manner, with particular reference to their importance in manufacturing.

Strain Energy Methods of Stress Analysis. By A. J. Sutton Pippard. Longmans, Green & Co., London and New York, 1928. Cloth, 6 × 9 in., 146 pp., diagrams, $5.

Although Castigliano's classic work on elastic stresses in structures is available in the English language, it is difficult for the student, and in consequence the methods of analysis which he originated are not widely known. The present book, which aims to fill the gap between the outline treatment given in general works on the theory of structures and the original treatise, is intended to give the structural designer a sound knowledge of the methods.

The book is in two sections. The first contains the theory of the method, with statements and proofs of the essential elastic theorems. The second shows, by worked examples, applications of the method to typical problems in the design of airplanes, roof trusses, bow girders, and flywheels.

Strength of Materials. By Mansfield Merriman. Seventh edition, revised by Thaddeus Merriman. John Wiley & Sons, New York, 1928. Cloth, 5 × 8 in., 204 pp., tables, $1.75.

This textbook is intended to present the subject in such a manner that the essential principles of the subject may be understood by students with only the ordinary high-school acquaintance with mathematics. The new edition has been revised and amplified in certain parts and new matter added on Portland cement and concrete.

Technology of Low Temperature Carbonization. By Frank M. Gentry. Williams & Wilkins, Baltimore, 1928. Cloth, 6 × 9 in., 399 pp., diagrams, tables, $7.50.

Recent interest in low-temperature carbonization has resulted in a vast amount of periodical literature, but there has been great need for a book in which the scattered data were collected and correlated so that they were readily available to workers in this art. The present work reviews our knowledge of the principles underlying carbonization and gives an account of present practice. Chapters are devoted to the various products and their utilization, to the processes in use, to the operation and design of plants, and to the economics of the industry. An extensive bibliography is appended.

Über die Festigkeit Einwandiger Kegeliger Kolben. By Hermann Tellers. (Forschungsarbeiten auf dem gebiete des Ingenieurwesens, heft 305.) V.D.I. Verlag, Berlin, 1928. Paper, 9 × 12 in., 30 pp., diagrams, tables, 4.50 r.m.

A detailed theoretical and experimental study of the stresses in conical pistons, such as are used especially in marine and rolling-mill engines. The author develops a method by which the stress at any point may be determined, and gives a critical report on the methods used in the past.

Über Die Schmierschicht in Gleitlagern und Ihre Messung Durch Interferenz. By Robert Wolff. (Forschungsarbeiten, heft 308.) V.D.I. Verlag, Berlin, 1928. Paper, 9 × 12 in., 25 pp., diagrams, tables, 5 r.m.

Presents the results of investigations carried out in the bearings laboratory of the German railways upon conditions in heavily loaded bearings. The author describes a new method of measuring oil films which is particularly accurate for bearings of this kind, and presents some conclusions drawn from measurements made by it. Among other results, he shows that viscosity is entirely unreliable as an indication of lubricating value, and that the classic hydrodynamic ideas concerning the thickness of oil films are inadequate for thin films.

Die Verwendbarkeit der Röntgenverfahren in der Technik. By C. Kantner and A. Herr. V.D.I. Verlag, Berlin, 1928. Paper, 6 × 8 in., 77 pp., illus., 4.50 r.m.

The increasing use of X-rays in testing materials is the cause of this little book, which is intended for those interested in inspection who are not versed in X-ray photography.

The treatment is entirely practical. The authors point out the fields in which the method has been found useful, and describe the apparatus used. Directions for equipping a laboratory are given, and there is a brief bibliography.

Warme- und Kälteverluste Isolierter Rohrleitungen und Wände. By Grunzweig and Hartmann, G.m.b.H. Ludwigshafen a. Rhein. Julius Springer, Berlin, 1928. Fabrikoid, 6 × 9 in., 269 pp., 16 r.m.

This collection of tables has been prepared by a manufactory of heat-insulating materials for use in its own work. The tables show in detail the hourly loss of heat or cold from pipes and chambers, the effect of wind, and other useful data. They are calculated for all ordinary commercial sizes of pipe and for temperatures from —40 to +1000 deg. cent., and can be used for pipes with any or no insulation.

Versuche mit Freiaufliegenden Rechteckigen Platten unter Einzelkraft-Belastung. By M. Bergsträsser. (Forschungsarbeiten auf dem gebiete des Ingenieurwesens, heft 302.) V. D. I. Verlag, Berlin, 1928. Paper, 9 × 12 in., 25 pp., illus., diagrams, 4.50 r.m.

While a number of methods have been proposed for determining the stresses in rectangular plates, these have been based on certain assumptions regarding conditions at the edges. In the present experiments these assumptions have been tested, to ascertain whether they actually represent the conditions or not. The report gives a full account of the experiments, compares the results with the theoretical calculations, and draws conclusions as to the accuracy of the latter.

Synopses of A.S.M.E. Transactions Papers

THE papers abstracted on this and following pages appear in the Aeronautics, Applied Mechanics, Fuels and Steam Power, Iron and Steel, Machine-Shop Practice, and Textile sections of A.S.M.E. Transactions as published in its new form. These sections have been sent to all who registered in the similarly named Divisions. Other sections are in the course of preparation and will be announced, when completed, in later issues of "Mechanical Engineering."

AERONAUTIC PAPERS

The Development and Technical Aspects of The Fairchild Caminez Engine

By HAROLD CAMINEZ

Fairchild Caminez Engine Co., Farmingdale, L. I., N. Y.

THE object of this paper is to explain the operation of the drive-cam mechanism and to give a general description of the Fairchild Caminez engine. The history of the engine development is next related, following which come particulars of tests conducted and problems encountered. A discussion of the principles and the method of the drive-cam design is also included. [Paper No. AER-50-9]

An Introduction to the Problem of Wing Flutter

By CARL F. GREENE

1st Lieut. A. C., Airplane Branch, Material Division, U. S. Army Air Corps, Wright Field, Dayton, Ohio

AFTER defining wing flutter and analyzing the evidence accumulated as to the conditions under which it occurs, the author gives particulars of a study of the torsional oscillations of an airfoil, and of the position of the elastic axis and location of the center of mass of an airplane wing. He then discusses the aerodynamic considerations involved in the problem and the present status of the latter, and concludes with a brief discussion of the field of future investigation. The purpose of the paper is not to present any general solution for the problem but to promote discussion as to rational methods of employing such data as are now or may be on hand with a view to formulating a sound basis for future design procedure. [Paper No. AER-50-10]

Combustion in Aircraft Oil Engines

By WM. F. JOACHIM

Mechanical Engineer, National Advisory Committee for Aeronautics, Langley Field, Va.

THE oil engine is the most efficient self-contained prime mover so far developed, and endeavors are now being made to adapt it to the high-speed service required in automotive vehicles and aircraft. The author discusses the difficulties encountered in obtaining uniformly controlled and efficient combustion at high speeds, and enumerates the factor upon which the solution of these problems depend. He also considers the advantages of light-weight, high-speed, high-capacity oil engines in aircraft, namely, high cycle efficiency, ability to burn heavy fuels efficiently, and general mechanical simplicity and better adaptability to the two-stroke cycle. He then establishes formulas for the evaluation of aircraft-engine performance using them in comparing the performance of 85 different carburetor aircraft engines, both air- and water-cooled, and 101 different oil engines. He concludes by giving brief particulars of researches being conducted by the N.A.C.A. to determine the laws governing the hydraulics of fuel-injection systems, and the formation and distribution of oil sprays, as well as their ignition and combustion in spray combustion chambers and in engines fitted with various pistons and cylinder heads. [Paper No. AER-50-11]

Cycloidal Propulsion Applied to Aircraft

By FREDERICK KURT KIRSTEN

Professor of Aeronautical Engineering, University of Washington, Seattle, Wash.

AFTER reporting observations on the flight of gulls which indicated that the wing top moves with a cycloidal motion, the author proceeds to an analysis of this type of motion as it might be applied to the propulsion of aircraft. Various aspects of cycloidal propellers, including their efficiency, are discussed, and their application to heavier-than-air and lighter-than-air craft is urged. The advantages of this method of propulsion are discussed. Tests both of model and full-size propellers are referred to, but are not, however, included in the paper. [Paper No. AER-50-12]

Meteorological Service for Commercial Airways

By C. G. ROSSBY

Chairman, The Daniel Guggenheim Commission on Aeronautical Meteorology, Department of Commerce, Washington, D. C.

THE purpose of a meteorological service for commercial airways is to provide two things: safety and efficiency in operations. Up to the present date, the necessity for weather information for safe air transportation has been stressed over and over again, but small attention has been paid to the increase in efficiency possible through the proper organization of a weather information service for commercial airways. The author discusses at length both of these factors. [Paper No. AER-50-13]

Air-Transport Engineering

By L. D. SEYMOUR

Chief Engineer, National Air Transport, Inc., New York, N. Y.

THE author takes up and discusses briefly some of the more important subjects which come to the air-transport engineer for consideration. These are: the selection of routes; selection of aircraft; preparation of terminal field equipment; development of airways; provision of aids to aerial navigation; determination of flying schedules; establishment of sources of material supply; keeping of performance records; and the preparation of cost estimates and analyses. [Paper No. AER-50-14]

The Design of Commercial Airplanes

By MAC SHORT

Vice-President and Chief Engineer, Stearman Aircraft Company, Wichita, Kan.

COMMERCIAL-AIRPLANE design, according to the author, had its inception in the three-place OX-engined plane. From a crude beginning in 1919 and with but little encouragement it has developed to a point where large production is demanded as well as many refinements, and along with this has come a universal awakening to the importance of commercial aviation in the nation's business. Intensive production methods are not as yet entirely applicable to the machines at present manufactured in quantity, but nevertheless have possibilities. Permissible expenditures to save a pound in weight amount to from one to two dollars. There is a constantly increasing demand for better performance, greater useful load, artistry of appointment, and comfort in the evolution from the open-cockpit to the enclosed airplane. [Paper No. AER-50-15]

Gluing Wood in Aircraft Work

By T. R. TRUAX

Wood Technologist, Forest Products Laboratory, Madison, Wis.

THE author discusses the glues used in aircraft, and describes the gluing operation and its application to different species of wood. He also makes recommendations for the gluing of different woods with both animal and casein glues, giving data on glue-water proportions, glue spread, temperature of wood, pressure to be applied to joint, and time the joint should remain under pressure. [Paper No. AER-50-16]

The Oil Engine and Aeronautics

By COMMANDER E. E. WILSON, U.S.N.

AFTER a discussion of the fundamental requirements of aircraft engines, the author states it as his belief that the two important advantages of the heavy-oil engine for aircraft service, viz., inherently superior fuel economy and inherent reduction in fire risk, are of sufficient importance to warrant prosecuting the project vigorously. He believes that the first application of the oil engine in aeronautics should be in the airship, because it is here the advantages are realized to the fullest extent. Oil-engine development should start with the highest development of the gasoline aircraft engine, and not with an initial handicap of incorrect cooling and incorrect mechanical form. The Navy's rigid-airship program needs a development of this sort now. [Paper No. AER-50-17]

APPLIED MECHANICS PAPERS

Vibration of Frames of Electrical Machines

By J. P. DEN HARTOG

Research Engineer, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

IN CONNECTION with the attempts to reduce the noise of the electrical machinery in general, and more especially of small motors for domestic use, it is of importance to be able to calculate the natural frequency of the vibration. It is shown that the frame, which usually emits a large portion of the total noise, can, in many cases, be regarded as a part of a ring with rigid ends. Formulas and curves are given in the paper for the calculation of this fundamental frequency. The derivation of these formulas is not given in the body of the paper, but in an appendix. [Paper No. APM-50-6]

The Theory of the Dynamic Vibration Absorber

By J. ORMONDROYD and J. P. DEN HARTOG

Respectively Motor Engineering Department and Power Engineering Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE "vibration absorber" discussed in this paper consists of a small vibratory system tuned to the operating frequency of a larger machine and attached to it in a suitable location. When properly designed this will reduce the vibrations of the machine itself materially. The absorber, without damping, annihilates vibrations of its own frequency completely, but creates two other critical speeds in the machine system. Therefore it is suitable only for applications on constant-speed machinery. When damping is introduced into the absorber it constitutes a simple and efficient means of diminishing the vibrations of a machine of variable speed. An analysis of its operation in simple cases with and without damping is given in the paper, tests made on a model are described, and actual applications are discussed. [Paper No. APM-50-7]

The Range and Severity of Torsional Vibration in Diesel Engines

By FREDERIC P. PORTER

Technical Aide, New York Navy Yard, New York, N. Y.

THIS paper gives a general treatment of the subject of the torsional vibration of irregular shafts. It is illustrated by examples of computations for the shafting of certain Diesel-engine installations that have been investigated. The material presented is the result of a study to determine accurately the range of vibrations and the speeds at which they occur. The data also give the results of a study on the effect of elastic hysteresis and other damping forces in determining the maximum vibration at the various critical speeds. [Paper No. APM-50-8]

Strength of Steel Columns

By H. M. WESTERGAARD and WM. R. OSGOOD

Respectively Professor of Theoretical and Applied Mechanics, University of Illinois, Urbana, Ill., and Assistant Professor of Structural Engineering, Cornell University, Ithaca, N. Y.

IN THIS paper the authors present methods by means of which the action of steel columns which are stressed beyond the proportional limit and which are eccentrically loaded or initially curved may be analyzed. Two methods are used in analyzing initially curved pin-ended columns. By the simpler method results are obtained which are on the side of safety and which differ only slightly from those obtained by the more involved and more nearly exact method. [Paper No. APM-50-9]

FUELS AND STEAM-POWER PAPERS

Papers Presented at Spring, Annual, and Section Meetings in 1927–28

TWENTY-SIX papers dealing with fuels and steam power were presented at meetings of the A.S.M.E. held in 1927–28. These papers, which are listed below, are published together as

a group and are not available singly. In ordering ask for No. FSP-50-25/50.

IRON AND STEEL PAPERS

Physical Properties of Alloy Steels Under Various Heat Treatments and at Elevated Temperatures

By C. B. CALLOMON

Manager, Alloy Steel Department, Allegheny Steel Company, Brackenridge, Pa.

THE author confines his treatment to two of the newer and less well-known ferrous alloys: (1) so-called "stainless" iron, a steel containing from 12 to 16 per cent of chromium and less than 0.12 per cent carbon; and a "super" stainless iron containing from 12 to 20 per cent of chromium and 7 to 10 per cent of nickel. The former not only resists corrosion but is readily machinable; it is susceptible to heat treatment, under which it attains remarkable physical properties fitting it for a wide range of engineering applications. The second alloy, the strength of which is increased by hot or cold working rather than by heat treatment, resists corrosion much better than the first one, but is more difficult to form and machine. Further, it is from 7 to 15 per cent lighter than other corrosion-resisting metals and alloys. Both alloys have high tensile strength at elevated temperatures; the latter being the better in this respect, however, having an ultimate tensile strength of 25,500 lb. at 1650 deg. fahr. [Paper No. IS-50-4]

The Use of Pulverized Coal in Basic Open-Hearth Furnaces

By E. L. HERNDON

Receiver, The Eastern Steel Co., Pottsville, Pa.

THE experience of The Eastern Steel Company with pulverized coal as fuel for basic open-hearth furnaces was anything but voluntary. The company had been very happily using oil which was low in price and high in quality, when the cost of this fuel began to rise and continued until it was necessary to cease using it. Since then, for thirteen years the company has continuously wrestled with the problems arising in the development of a little-known fuel. At times it has been more than willing to abandon the entire plan. Very little working knowledge was gained before the war period, and during the war costs were of less consequence than ordinarily. After that period passed, however willing the company was to alter the design of its furnaces and change the fuel, the necessary capital was never available. After many tribulations and at times successive disappointments, some understanding of the subject has been reached, and it is believed that pulverized coal is the best fuel for conditions as they exist. It is not recommended on that account, however, that others adopt pulverized coal until a thorough examination of each situation has been made. [Paper No. IS-50-5]

Recent Developments in the Use of Nickel Steels

By CHARLES McKNIGHT

Development and Research Department, The International Nickel Company, New York, N. Y.

AFTER recounting the early uses of nickel steel for armor plate, guns, and projectiles, the author deals at some length with the development of its use in locomotive construction for heavy forgings and later for the shell plates of high-pressure locomotive boilers. He then touches briefly on three recently developed iron-nickel alloys—Invar, Permalloy, and Nickeloy—the latter two being employed extensively in electrical work, and with the substitution of nickel-chrome-steel castings for those of manganese steel in trackwork. He concludes with a statement of the advantageous properties conferred on cast iron by the addition of nickel. [Paper No. IS-50-6]

The Manufacture of Seamless Tubes

By R. C. STIEFEL and GEORGE A. PUGH

Respectively Consulting Engineer and Vice-President (Mem. A.S.M.E.), and Assistant Vice-President (Jun. A.S.M.E.), The Aetna-Standard Engineering Co., Youngstown, Ohio

TWO methods are today available in the manufacture of seamless tubes of 4 in. and greater diameter. These are the pilger process and the automatic or plug-mill process. The cost of installation is about the same for either process. The cost of tool equipment is much greater for the pilger process and it is claimed that the quality of the tube, particularly in the matter of service, is more uniformly reliable with the plug rolling process than with the pilger process.

Referring particularly to the plug rolling process the authors discuss the difficulties of operation and modern improvements aimed at obviating these difficulties. A distinction is emphasized between the part of the billet directly affected, or as the authors style it, "explored," by the mandrel, and the part which is unexplored and the small unexplored section is in relation to the full section of the solid billet, the fewer are the defects on the inside of the pierced tube. This leads to the conclusion that for the production of a given size of tube, as small a solid billet as possible should be used. This is proved by a formula given for power consumption in piercing. The design of the piercing mill is next considered from the same point of view and the most recent developments in the use of expanding mills are described. [Paper No. IS-50-7]

Mechanical Properties of Aluminum Casting Alloys at Elevated Temperatures

By R. L. TEMPLIN, C. BRAGLIO, and K. MARSH

Respectively Chief Engineer of Tests, Testing Engineer (Mem. A.S.M.E.), and Chief of Pyrometric Division, Aluminum Company of America, Pittsburgh, Pa.

THE investigational work described in Part 1 of the paper includes tensile results obtained from "short-time" high-temperature tests of ten different aluminum casting alloys and very pure cast aluminum, and for various heat treatments in the case of some of the alloys. All the specimens tested were sand cast and include the more common commercial casting alloys of aluminum.

Tensile strength, yield point, elongation in 2 in., reduction in area, and Young's modulus values are given for various temperatures throughout the range 75–800 deg. fahr. A typical set of stress-strain curves are given for one alloy, and detail curves showing the effects of temperature on the tensile stength, yield point, and reduction in area for all the materials discussed. An average curve and formula are given showing the effects of temperature on Young's modulus for all aluminum alloys.

Data are presented to show how certain effects of temperature on aluminum alloys susceptible to heat treatment may be appreciably modified by still further heat treatment or artificial aging. A method is indicated for applying experimental results from a single lot of specimens to commercial-product average values, together with a complete table or recommended tensile-property values at various temperatures for the alloys tested.

The second part of the paper describes the original heating equipment, the alternate tests and alterations to equipment to determine and improve the temperature uniformity throughout the specimen; also the method of measuring the specimen temperatures during tensile tests, data being presented to substantiate the reliability of this method.

Consideration of the results of temperature-distribution tests made with the final arrangement of the heating equipment and the temperature-measuring equipment used for tensile tests, indicates that an accuracy of temperature measurement of plus or minus 1 per cent and a maximum temperature differential throughout specimen of 10 deg. fahr. are obtained. [Paper No. IS-50-8]

TEXTILE PAPERS

Increasing the Production of Cotton Padders

By REYNOLDS LONGFIELD

Industrial Engineer, Bellman Brook Bleachery, Fairview, N. J.

WHEN floor space becomes cramped and production throttled in certain departments of a growing business, the management is confronted with the task of enlarging capacity. The author discloses the procedure followed in the dye house of a cotton-finishing plant for increasing production per man-hour and per machine-hour without investment for additional equipment. He describes the psychological background and existing handicaps, and outlines methods of overcoming both with results of noteworthy improvements. [Paper No. TEX-50-1]

The Value of Water in Textile Mills for Purposes Other Than Water Power

By CHARLES T. MAIN

Pres., Chas. T. Main, Inc., Engineers, Boston, Mass. Past-President A.S.M.E.

THE value of water for industrial purposes—process water, water for condensers, etc.—is an item which must be included in the valuation of many industrial properties. The object of the paper is not so much to establish definite values as to discuss methods which will assist in arriving at definite figures for any particular case. In his analysis the author discusses four cases and various conditions which affect them: (1) Where water is purchased from a water-power company; (2) where it is taken from a stream on which the user owns the riparian rights; (3) where it is obtained from driven wells; and (4) where it is purchased from a town or city supply. An example of the use of the basic figures arrived at by the author is given for the case of a colored woolen mill. [Paper No. TEX-50-2]

Comparative Performance of Looms with Plain and Roller Bearings

By GEORGE H. PERKINS

Consulting Engineer, Boston, Mass. Mem. A.S.M.E.

THE tests reported in this paper were undertaken to obtain authentic comparative data on the effect of the application of roller bearings on loom performance, with special reference to production gain, maintenance cost, and power saving. With this purpose in view, complete performance records were obtained from two groups of looms, each consisting of thirty-two 81-in. Hopedale "Norday" automatics, in regular operation at the plant of the Naumkeag Steam Cotton Co., Salem, Mass. These loom groups were identical in all respects, except for bearing equipment, and were under test and close observation for 26 full weeks of normal mill operation.

The production gain, saving in loom maintenance, and power economy shown by the test, while not large, were obtained in a modern textile mill of the highest type and one widely known for its efficiency. Larger production gains and increased savings in power and maintenance costs could undoubtedly be shown in the textile mill of average efficiency. [Paper No. TEX-50-3]

MACHINE-SHOP PRACTICE PAPERS

Ball-Bearing Machine-Tool Spindles

By THOMAS BARISH

Assistant Chief Engineer, Gurney Division, Marlin-Rockwell Corporation, Jamestown, N. Y.

THIS paper is a review of the three types of ball-bearing machine-tool spindles now in use, showing how rigidity is obtained in each type and what results are secured. There is also a historical review of the first type, which was originally put into service over ten years ago and has since received minor improvements. The three main groups are:

a Two-bearing, manually adjusted spindles
b Automatically spring-adjusted spindles
c Three-bearing spindles, adjustable and non-adjustable.

Comparisons are made between the various types for their rigidity, and some deflection curves and actual measurements of rigidity are quoted. [Paper No. MSP-50-10]

A Study of Tin-Base Bearing Metals

By O. W. ELLIS and G. B. KARELITZ[1]

Research Department, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa

[1] A.S.M.E.

THIS study represents the first part of an investigation of babbitts. It comprises the results of metallographic and mechanical tests on a series of tin-antimony-copper alloys containing up to 10 per cent of antimony and 8 per cent of copper. Relationships between the composition, microstructure, hardness, and compressive strength of these alloys are given, and the influences of elevated temperatures and of lead upon these properties are recorded. [Paper No. MSP-50-11]

The Design and Building of Jigs and Fixtures

By F. P. HUTCHISON

Chief of Tool Design, Manufacturing Objectives, and Labor Grading Division, Western Electric Co., Kearney, N. J., Jun. A.S.M.E.

THIS paper gives a brief description of the methods employed by the Western Electric Company in the manufacture of telephone apparatus and equipment. The same general procedure is followed for the manufacture of jigs and fixtures as for other classes of tools, the work being divided into five steps or divisions, namely, planning, designing, ordering, tool making, and inspection, which the author considers in the order given. [Paper No. MSP-50-12]

Maintenance of Machine Tools

By J. C. MATTERN

Equipment Engineer, Singer Manufacturing Company, Elizabethport, N. J. Mem. A.S.M.E.

THIS paper gives brief particulars regarding the procedure employed by the Singer Manufacturing Company in the repair of old tools and in the purchase or building of new ones. [Paper No. MSP-50-13]

Maintenance in the Large Industrial Plant

By C. M. THOMPSON

Plant Engineer, Henry Disston & Sons, Inc., Philadelphia, Pa

IN THIS paper the author presents details of the system employed in the Henry Disston & Sons works, in which maintenance costs of machinery are expressed as percentages of productive labor and as percentages of book value. [Paper No. MSP-50-14]

NOTE: Those who have not registered in the A.S.M.E. Aeronautic, Applied Mechanics, Fuels and Steam Power, Iron and Steel, Machine-Shop Practice, and Textile Divisions, whose papers are abstracted on this and previous pages, and who desire copies of any of these papers, may obtain them by using the form given below.

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AIR COMPRESSORS

Portable. Portable Air Compressors (Gleisfahrbare Untertage - Elektro - Kompressoren). Bergbau, vol. 40, no. 40, Oct. 6, 1927, pp. 553–556, 9 figs. Description of DEMAG air compressors traveling along narrow-gage tracks, suitable for mining work; also compressed-air locomotives.

AIR CONDITIONING

High Air Temperature. The Physiology of Work under High Air Temperature Conditions, K. Neville Moss. Junior Instn. Engrs.—Jl., vol. 37, part 11, Aug. 1927, pp. 541–547. Notes based on experimental work carried out for mining industry in Mining Department of University of Birmingham with view to obtaining information about work done by human body under varying conditions of air temperature and humidity; tests referred to have distinct practical value, apart altogether from their physiological interest.

AIRCRAFT CONSTRUCTION MATERIALS

Selection. Selection of Materials for Aircraft Structures, J. A. Roche. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 494–496. Formulas giving rational criteria for design of airplane members and for selection of most suitable materials, taking due account of physical properties of aircraft materials and of resistance that result from proper use of each; tables of relative strength values show which materials are best for various parts and how much weight it is wise to add for given reduction in parasite resistance or for given increase in output of power plant; properties of various materials are studied separately with relation to their functions, and indexes are given classifying them in order of their merit for tension and compression, and for beams and columns.

AIRPLANE ENGINES

Combustion in. Combustion Time in the Engine Cylinder and Its Effect on Engine Performance, C. F. Marvin, Jr. Nat. Advisory Com. for Aeronautics—Report, no. 276, 1927, 16 pp., 16 figs. Outline of what may happen in engine cylinder during burning of a charge; suggests type of information needed to supply details of picture and points out how combustion time and rate affect performance of engine; theoretical concept of flame front which is assumed to advance radially from point of ignition is presented, and calculations based on area and velocity of this flame and density of unburned gases are made to determine mass rate of combustion; from this rate mass which has been burned and pressure at any instant during combustion are computed; effects of different rates of combustion of engine performance are discussed and importance of proper spark advance is emphasized.

Fairchild Caminez. Fuel Tests on the Fairchild Cam Engine. Aviation, vol. 23, no. 19, Nov. 7, 1927, pp. 1114–1116. Flights made in Waco 10 to determine engine-endurance possibilities.

Lorraine. The New Lorraine 650-Hp. Engines (Les nouveaux moteurs Lorraine 650 HP). Aéronautique, vol. 9, no. 99, Aug. 1927, pp. 252–253, 5 figs. Engine has 18 water-cooled cylinders in W formation; crankshaft is carried in 7 bearings; engine runs at 1800 r.p.m. and has compression ratio of six; it drives propeller through planetary reduction gearing. See brief translated abstract in Automotive Abstracts, vol. 5, no. 10, Oct. 1927, p. 306.

Supercharging. The Supercharging of Aircraft and Motor-Vehicle Engines, A. H. R. Fedden. Roy. Aeronautical Soc.—Jl., vol. 31, no. 202, Oct. 1927, pp. 933–961 and (discussion) 961–972, 24 figs. Describes main types of engines, advantages and difficulties of this form of supercharging, and likely lines of development.

Wright Whirlwind. The Wright Whirlwind Engine in Commercial Operation, C. H. Biddlecombe. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 478–488, 10 figs. Experience obtained with engine in 13 months of flying operation from June 18, 1926, to July 31, 1927, over Boston-and-New York City Air Mail route; describes three types of airplane used; namely, Curtiss Lark, Fokker Universal, and Fokker Trimotor, all fitted with Wright J-4B engine; comparison of air-cooled and water-cooled types of engine in commercial service, based upon author's experience with both; advantages and disadvantages of three-engined aircraft for purely commercial operation.

AIRPLANE PROPELLERS

Metal. Fairey Metal Airscrews in Schneider Race. Flight, vol. 19, no. 42, Oct. 20, 1927, pp. 735–736, 3 figs. Their design and manufacture.

Stresses and Deformation in. Determination of Stresses and Deformation in Airplane Propellers (Beitrag zur Ermittlung der Beanspruchungen und der Formänderungen von Luftschrauben), F. Seewald. Berichte u. Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 14, Dec. 1926, pp. 85–95, 28 figs. Method is described for determination of strength of propellers of any given design; it is shown that stresses in propellers are greatly influenced by design.

AIRPLANES

Airfoils. Airfoil Lift with Changing Angle of Attack, E. G. Reid. Nat. Advisory Com. for Aeronautics—Tech. Note, no. 266, Sept. 1927, 15 pp., 9 figs. Tests made in atmospheric wind tunnel of Nat. Advisory Com. for Aeronautics to determine effects of pitching oscillations upon lift of airfoil; it has been found that lift of airfoil, while pitching, is usually less than that which would exist at same angle of attack in stationary condition, and that behavior of pitching airfoil may be qualitatively explained on basis of accepted aerodynamic theory.

Drag. Drag Measurements on a Junckers Wing Section (Profilwiderstandsmessungen an einem Junckers-Tragflügel), H. Weidinger. Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 14, Dec. 1926, pp. 112–125, 26 figs., and translation in Nat. Advisory Com. for Aeronautics—Tech. Memorandum, no. 428, Sept. 1927, 47 pp., 25 figs. Application of Betz method to results of comparative tests made on a model and on airplane in flights.

Flutter. Aileron Flutter and Its Prevention (Ueber das Leitwerkflattern und die Mittel zu seiner Verhütung), F. N. Scheubel. Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 14, Dec. 1926, pp. 103–106 and (discussion) 106–107, 15 figs. Results of author's investigation.

Flying Boats. See FLYING BOATS.

Focke-Wulf. The Focke-Wulf "Moewe." Eng. Progress, vol. 8, no. 11, Nov. 1927, p. 290, 2 figs. New commercial airplane, type A 17, is high-winged monoplane without external bracing of wings, which form one continuous supporting surface, composed of two box-shaped beams, plywood ribs and plywood covering; air-cooled 420-b.hp. Bristol-Jupiter engine is built into forepart of fuselage and fixed to its four main girders by means of bolts.

The New Focke-Wulf Light Airplane (Das neue Focke-Wulf-Kleinverkehrsflugzeug "F 19," Ente). Luftfahrt, vol. 31, no. 18, Sept. 22, 1927, pp. 283–285, 3 figs. Two-engined airplane F 19 of the Ente (duck) series, weighing 1140 kg. and

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

carrying 450 kg. more; features a third forewing and high vertical tail; aerodynamic characteristics evolved after long study at Goettingen experiment station.

Giant. Future Development of Giant Airplanes for World Commerce (Die kommende Entwickelung des Riesenflugzeuges für den Weltverkehr), B. von Römer. Luftfahrt, vol. 31, no. 20, Oct. 22, 1927, pp. 307–311, 6 figs. Sketches of some projected German multi-engined airplanes and flying boats of as much as 140 m. wing speed, 15,000 hp., to accommodate as many as 150 passengers and crew of 35.

Gliders. Approximation Method for Determining the Static Stability of a Monoplane Glider (Näherungsverfahren zur Bestimmung der statischen Stabilität beim Eindecker), A. Lippisch. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 18, no. 11, June 14, 1927, pp. 251–256, 10 figs., and translation in Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 436, Nov. 1927, 17 pp., 10 figs. Presents formulary intended to furnish, in addition to stability check for builder, practical aid in calculating and dimensioning gliders.

Glider Construction and Design, A. Gymnich. Nat. Advisory Com. for Aeronautics—Tech. Memorandums, no. 434, Oct. 1927, 20 pp., 3 figs. Endeavor to draw a strict line between gliders and soarers has been abandoned and following classification adopted: gliders controlled by shifting weight of body; gliders controlled by rudders; gliders controlled by wings; building materials and parts.

Some German Gliders of 1920–1923. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 433, Oct. 1927, 20 pp., 13 figs. Details of different types. Translated from "Der Gleit- u. Segelflugzeugbau," by Alfred Gymnich.

Light. Design and Function of Light Airplanes (Entwurf und Aufgaben des Leichtbaues), A. Rohrbach. Berichte u. Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 14, Dec. 1926, pp. 64–70 and (discussion) 70–78, 24 figs. Deals with problems of material and manufacture; choice of wood vs. metal, duralumin vs. steel, open vs. closed profiles, and metal vs. fabric covering.

Metal Construction. Metal Construction of Aircraft, R. D. Weyerbacher. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 489–493, 8 figs. Enumerates limitations of wood and advantages of metal as structural materials for aircraft and concludes that weight can be saved and greater reliability secured with metal construction; savings effected by use of metal in place of wood in Navy flying boat are tabulated; use of metal, chiefly aluminum alloys, for fittings and structural parts, fabrication of ribs, fuselages, hulls and floats; expedient for production of pressed-metal parts in small quantities; emphasis is laid on necessity for preventing corrosion by avoiding contact between dissimilar metals and by thorough application of protective coatings.

Model Tests. Mass Distribution and Performance of Free Flight Models, M. Scherberg and R. V. Rhode. Nat. Advisory Com. for Aeronautics—Tech. Note, no. 268, Oct. 1927, 25 pp., 4 figs. Equations which relate motions of airplane and its model are given; neglecting scale effect, these equations may be used to predict performance of airplane, under action of gravity alone, from data obtained in making dropping tests of correctly balanced model.

Napier Lion. The Napier Lion, Series V, Aero-Engine. Engineering, vol. 124, no. 3225, Nov. 4, 1927, pp. 569–573, 21 figs., partly on p. 584 and supp. plate. Series V, 450-hp. engine has 12 cylinders, arranged in three blocks of four each, central block being in vertical plane, with port and starboard blocks at angle of 60 deg. to vertical.

Parachutes. See PARACHUTES.

Performance. A Simple Theoretical Method of Analysing and Predicting Airplane Performance, I. H. Driggs. Flight, vol. 19, nos. 34, 38 and 43, Aug. 25, Sept. 22, and Oct. 27, 1927, pp. 596a–596d, 668d–668f, and 750a–750b. Gives formulas to show relation of certain fundamental variables to absolute ceiling and to rate of climb, and to allow estimate to be made for these quantities with but minimum of calculation.

Seaplanes. See SEAPLANES.

Slot-and-Aileron Control. On Salvation by Slots. Aeroplane, vol. 33, no. 17, Oct. 26, 1927, pp. 549–570 and 572, 2 figs. It is claimed that with Handley Page slot (plus aileron) control, even worst pilot cannot spin and nose-dive if he stalls his machine.

Structural Design. Some Further Practical Points in the Structural Design of Aircraft. Inst. Aeronautical Engrs.—Jl., vol. 1, no. 9, Sept. 1927, pp. 5–14 and (discussion) 14–19, 9 figs. Limitation of size of airplanes and weights of various components; longitudinal stability; strength of body with vertical loading; and strength of body with horizontal loading; strength of body longerons; strength of vertical and horizontal body struts; strength of wing-bracing struts; properties of wood.

Training and Stunt. The "Flamingo" Biplane. Aviation, vol. 23, no. 19, Nov. 7, 1927, pp. 1108–1109. German training and stunting airplane is powered with Siemens-Halske engine; manufactured by Bayerische Flugzeugwerke A.G.

Transoceanic. The Blériot Transatlantic Airplane (Louis Blériot et la traversée commerciale de l'Atlantique). Aéronautique, vol. 9, no. 99, Aug. 1927, p. 248, 3 figs. L. Bleriot and Birkigt, the designer of the Hispano-Suiza, are producing a transatlantic mail and transatlantic passenger plane; former will weigh 8 tons and have four 250-hp. engines; latter is to contain life boat built into fuselage; four engines will develop total of 2800 hp.

Wing and Propeller. The Influence of Wing and Propeller on Each Other (Die gegenseitige Beeinflussung zwischen Tragflugel und Propeller), R. Seiferth. Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 14, Dec. 1926, pp. 108–111, 8 figs. Results of author's investigation.

Wings. Pressure Distribution Tests on PW-9 Wing Models Showing Effects of Biplane Interference, A. J. Fairbanks. Nat. Advisory Com. for Aeronautics—Report, no. 271, 1927, 13 pp., 14 figs. Wing models were tested individually and in biplane combination; it is concluded that effect of biplane interference on pressures on wings is practically confined to lower surface of lower wing; overhanging portion of upper wing is not greatly affected by presence of lower wing; and a slight wash-in at center section of upper wing satisfactorily compensates for a reduced chord at this section (providing airfoil section is not mutilated) and prevents a large reduction in normal force over this portion of wing.

ALLOY STEELS

Molybdenum. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. Steel Treat.—Trans., vol. 12, no. 5, Nov. 1927, pp. 814–826, 3 figs. Discusses molybdenum and steels containing molybdenum; molybdenum as principal element in high-speed steel has not met with much favor, but low amounts in conjunction with other alloying elements has proved very valuable in steels for engineering construction; it is claimed that molybdenum steels are inherently fine grained, that they have wide quenching range and are not "temper brittle;" by proper heat treatment high degree of toughness in proportion to strength may be developed; hardening with relatively mild quenching, deep penetration of hardening effect, good forging and machining properties are among advantages claimed; properties and uses of specific types of chromium-molybdenum, nickel-molybdenum, and chromium-nickel-molybdenum steels, are discussed.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Bronzes. See BRONZES.

Copper. See COPPER ALLOYS.

Corrosion-Resistant. Selection of Corrosion Resistant Alloys, W. M. Mitchell. Blast Furnace & Steel Plant, vol. 15, no. 9, Sept. 1927, pp. 427–434. Causes of corrosion are explained; elements which increase resistance of steel are silicon, copper, and chromium; non-ferrous alloys effective under certain conditions.

ALUMINUM

Machining. Machining Aluminum, R. L. Templin. Am. Inst. Min. & Met. Engrs.—Tech. Publication, no. 31, 1927, 15 pp., 10 figs. Comparison of tools more commonly used in machining brass and mild steel with tools most suitable for machining aluminum, and specific discussion of individual tools.

Sand Casting. Some Notes on Sand-Casting Aluminum. Mech. World, vol. 82, no. 2128, Oct. 14, 1927, pp. 290–291. Light weight of aluminum has always to be borne in mind, hence it must be fluid and poured quickly, and it must not meet much resistance from steam or air in mold; molds should be as dry as possible while still remaining workable, and they must be well vented in places where gases of any kind would otherwise be able to form pockets.

ALUMINUM ALLOYS

Aluminum-Copper. Industrial Utilization of Aluminum Alloys (A propos de l'utilisation industrielle des alliages d'aluminium), H. Pommerenke and P. Herman. Revue de Métallurgie, vol. 24, no. 6, June 1927, pp. 297–306, 6 figs.; and translated abstract in Metallurgist (Supp. to Engr.), Oct. 28, 1927, pp. 154–155, 2 figs. Results of investigation on tensile strength and hardness of binary copper-aluminum alloy containing 8 per cent copper; tests are designed to show that at all events for automobile industry such alloy, cast under proper conditions, avoiding overheating, will in sand-cast state meet all ordinary requirements, and that for special conditions calling for greater strength, hardness and tensile strength of such alloy can be economically increased 100 per cent by heat treatment.

AMMONIA COMPRESSORS

Turbo. Brown Boveri Ammonia Turbo-Compressor for 6–8,000,000 Kilo-Galories per Hour, for the Kaiseroda Refrigerating Installation, A. Baumann. Brown Boveri Rev., vol. 14, no. 10, Oct. 1927, pp. 255–265, 14 figs. Research work carried out with regard to possible applications of turbo-compressor in refrigerating plants; ammonia turbo-compressor supplied for the Kaiseroda refrigerating plant is largest turbo-compressor made up to present and is first to be used in an ammonia plant; special advantages are small space required and large regulating range obtained from use of movable diffusers.

AUTOMOBILE ENGINES

Carburetors. The Function of Carburetors with Special Reference to Automobile Engines (Le fonctionnement des carburateurs des moteurs à explosion, envisagé principalement au point de vue de leur application à l'automobile), A. Coppens. Chaleur & Industrie, vol. 8, nos. 87 and 90, July and Oct. 1927, pp. 424–428 and 603–610, 17 figs. July: Deals with control of carburetors. Oct.: Construction of curves and diagrams.

Paris Show. Twenty-first International Automobile Show, Paris, October 1927 (La XXI exposition internationale de l'automobile), C. Martinot-Lagarde. Technique Moderne, vol. 19, no. 20, Oct. 15, 1927, pp. 653–658, 19 figs. Special descriptions of chassis and six-cylinder engines by Rochet-Schneider, Berliet, Voisin, etc., also of 5-hp. Corre-La Licorne engine, Zenith carburetors and gasoline filters; new Sensaud de Lavaud chassis especially featured.

Variable-Compression. A New Automobile Engine, Nau-Touron (Un nouveau moteur à courses inégales à faible obliquité de bielle et à compression variable), E. Marcotte. Arts & Metiers, no. 83, Aug. 1927, pp. 277–288, 23 figs. Theory and construction of engine of unequal stroke, slightly oblique connecting rod and variable compression; points out its special economic value for France in permitting use of various fuels, and its significance for aviation by making possible a wider range of flight.

AUTOMOBILE MANUFACTURING PLANTS

Citroen, France. Citroën Wins with American Mass Production Methods, V. Delport. Iron Trade Rev., vol. 81, nos. 10, 11 and 12, Sept. 8, 15 and 22, 1927, pp. 594–595, 660–661 and 716–717, 4 figs. Sept. 8 and 15: Forging department. Sept. 22: Parts are heat treated continuously.

Europe. American Vehicles Now Assembled in 25 Foreign Plants. Automotive Industries, vol. 57, no. 16, Oct. 15, 1927, p. 579. Number of plants has more than doubled in last three years; saving in ocean freight, lower duties, and cheaper labor are among advantages gained.

Heat Processes. Heating Processes Synchronized in Straight Line Production, J. B. Nealey. Iron Trade Rev., vol. 81, no. 10, Sept. 8, 1927, pp. 584–587, 5 figs. Methods and equipment of Ford Motor Co.' heating steel ingots.

AUTOMOBILES

Brake Linings. The Physical Testing of Asbestos Brake Linings, C. F. Ogren. India Rubber World, vol. 77, no. 2, Nov. 1, 1927, pp. 59–61, 7 figs. Gives general discussion and random observations on tests; reveals certain characteristics of brake linings.

Brake-Testing Machines. Brake-Testing Machine Simulates Road Operating Conditions. Automotive Industries, vol. 57, no. 19, Nov. 5, 1927, pp. 684–685, 4 figs. Synchrometer automatically makes record of decelerating characteristics of each wheel, plotting speed for each foot of travel from time brake is applied to complete rest.

British Design Trends. British Demand Is for Smaller Engines, Roomier Bodies, M. W. Bourdon. Automotive Industries, vol. 57, no. 18, Oct. 29, 1927, pp. 650–656, 9 figs. Situation as sized up by manufacturers and reflected in designs of leading makers at Olympia.

Ford. Mechanical Details of New Ford, A. F. Denham and L. C. Dibble. Automotive Industries, vol. 57, no. 22, Nov. 26, 1927, pp. 781–

785, 5 figs. Inspection of models of type coming off line at Fordson indicated higher speed engine of greater power and miniature Lincoln clutch and transmission.

Hupp. Hupp "6" Has New Body Lines and Larger Engine, A. F. Denham. Automotive Industries, vol. 57, no. 18, Oct. 29, 1927, pp. 639–641, 5 figs. Cylinder head, completely machined on inside, has spark plug over exhaust valve; Steeldraulic four-wheel brakes are adopted; liberal use made of chromium plating.

Mercedes-Benz. The Two-Liter Mercedes-Benz (Der Zweiliter-Mercedes-Benz), Mierwald. Allgemeine Automobil-Zeitung, vol. 28, no. 43, Oct. 22, 1927, pp. 25–27, 5 figs. Description and novel features of new small 6-cylinder car.

Olympia Show, London. Olympia Motor Show. Auto-Motor Jl., vol. 42, nos. 41 and 42, Oct. 13 and 20, 1927, pp. 853–870 and 881–898. Descriptions of exhibits arranged alphabetically by name of cars exhibited, giving in summarized form, special features as furnished by makers or concessionnaires. Oct. 20: Record of impressions of principal chassis and car exhibits based upon stand-to-stand tour.

Paris Show. Twenty-first Automotive Exposition, Paris, October 1927 (Le XXI salon de l'automobile et du cycle), G. Delanghe. Génie Civil, vol. 99, nos. 16, 17 and 18, Oct. 15, 22 and 29, 1927, pp. 365–379, 402–409 and 433–447, 131 figs. General impressions; world automobile statistics; French motorcylces: Alcyon, Peugeot, Terrot, etc; chassis and engines of French small cars: Amilcar and others; medium and high-powered cars; new designs by Sensaud de Lavaud, etc.

Progress. Progress in Design. Autocar, vol. 59, no. 1668, Oct. 21, 1927, pp. 816–870. Notes on development based upon characteristics of 312 different types of cars; available on British market.

Riley. Riley Refinements. Autocar, vol. 59, no. 1663, Sept. 16, 1927, pp. 523–524, 4 figs. Detail of improvements to the 12-hp. chassis and some new coachwork; price reductions for the 9-hp. car.

Shock Absorbers. Bosch Incorporates New Features in Type "Y" Shock Absorber, E. B. Neil. Automotive Industries, vol. 57, no. 18, Oct. 29, 1927, pp. 658–659, 3 figs. Action designed to give increasing resistance to rebound as amount of reaction and its rapidity increase; now in production for all sizes of passenger cars.

Springs. Automobile Springs (Federung der Fahrzeuge), E. A. Wedemeyer. Motorwagen, vol. 30, no. 16, June 10, 1927, pp. 367–370, 2 figs. Author's solution of general automobile-spring problem; problem leads to differential equation of fourth order; solution gives two values for proper period of oscillation of car; these motions of car are particularly unpleasant when one form of oscillation jumps over into another; especially objectionable is swinging around transverse axes which gives passenger sensation of being hit in back.

Spring Action (Die Reibungsdämpfung der Kraftwagenfedern), O. Holm. Motorwagen, vol. 30, no. 21, July 31, 1927, pp. 467–473, 10 figs. Mathematical investigation of amount of friction that is useful in springs; author's method is based on graphical analysis developed by Guembel; result is that at very low car speed absence of spring friction gives vertical accelerations greater than those of entirely unsprung car; it takes, however, only very small amount of friction to reduce these accelerations to value of those of unsprung car; at speeds above five miles per hour, the greater the spring friction, the greater are vertical accelerations. See brief translated abstract in Automotive Abstracts, vol. 5, no. 9, Sept. 20, 1927, p. 286.

Velie. Velie Enters Eight-Cylinder Field with Worm Drive Model. Automotive Industries, vol. 57, no. 19, Nov. 5, 1927, p. 679. Lycoming engine used in 125-in. wheelbase chassis; low overall height a feature.

AVIATION

Airports. The San Francisco Airport, C. D. Jobson. Aviation, vol. 23, no. 19, Nov. 7, 1927, pp. 1102–1104, 5 figs. Mills Field, which is municipally owned, is rated as one of best illuminated airports in world.

B

BALANCING

Principles. Balancing of Rotating Bodies, C. R. Soderberg. Tech. Eng. News, vol. 8, no. 5, Oct. 1927, pp. 212–216 and 246, 18 figs. Principles involved in mechanical balancing, with description of various types of balancing machines.

BEARING METALS

Selection. Choosing White Bearing Metals, E. R. Thews. Am. Mach., vol. 67, no. 20, Nov. 17, 1927, pp. 759–760. Great number of combinations possible in white bearing-metal alloys makes it desirable for designer and shop man to have clear understanding of effects of each element entering into alloy on final bearing qualities of metal to be selected for bearing.

BEARINGS, BALL

Manufacture. The Manufacture of Ball and Roller Bearings, G. Janes. Eng. Jl., vol. 10, no. 11, Nov. 1927, pp. 487–493, 22 figs. Details of major manufacturing operations.

BLAST FURNACES

Drying of Blast. Silica Gel. Chem. & Industry, vol. 46, no. 40, Oct. 7, 1927, pp. 902–904, 7 figs. It is found that silica gel can absorb at atmospheric temperature from 30 to 50 per cent of its weight of water, and that by raising temperature, done by passing waste blast-furnace gas at 640 deg. fahr., this water can be driven off, leaving reactivated gel ready for another cycle.

The Use of Silica Gel as a Medium for Drying Blast, E. H. Lewis. Foundry Trade Jl., vol. 37, no. 581, Oct. 6, 1927, pp. 3–6, 7 figs. Results of use of dry blast under Scottish conditions. Paper read before Iron and Steel Inst.

BOILER FEEDWATER

Treatment. Boiler Feed Water Treatment, E. Caldwell. Indus. Power, vol. 8, no. 4, Oct. 1927, pp. 54–58 and 94 and 96, 5 figs. Discusses necessity for treating boiler feedwater and various methods of treating.

Boiler Feed Water Treatment from a Manufacturer's Viewpoint, J. B. Romer. Am. Ry. Eng. Assn.—Bul., vol. 29, no. 298, Aug. 1927, pp. 64–69. Deals with scale, corrosion, embrittlement, and priming and foaming.

Treating Boiler Feed Waters, M. H. Watson. Power House, vol. 21, nos. 18 and 19, Sept. 20 and Oct. 5, 1927, pp. 17–20 and 117–121. Discussion of common impurities found in boiler feedwater, chemical treatment to prevent corrosion and foaming, and explanation of chemical reactions involved, with reference to external purification.

BOILER FURNACES

Air Preheaters. Large Air Preheaters for Boiler Furnaces (Gross-Abgas-Lufterhitzer zur Vorwärmung der Verbrennungsluft bei Dampfkesselfeuerungen), O. Brandt. Wärme, vol. 50, no. 31, Aug. 8, 1927, pp. 535–538, 7 figs.; and brief translated abstract in Power Engr., vol. 22, no. 259, Oct. 1927, p. 393. Author deals especially with large air preheaters, up to 55,000 sq. ft. heating surface, for use in conjunction with high-power boilers, particularly where economizers are not employed for preheating feedwater and it is desired to recover heat from flue gases as completely as possible by raising combustion air to 300 deg. cent. or higher; gives typical examples of such preheaters.

Automatic Regulation. Automatic Regulation of Boiler Furnaces (Zur Frage der selbsttätigen Feuerungsregelung), E. Schulz. Wärme, vol. 50, no. 26, July 1, 1927, pp. 445–449, 9 figs.; and brief translated abstract in Eng. & Boiler House Rev., vol. 41, no. 4, Oct. 1927, p. 205. Problem of operating automatically a bank of boilers is not so simple as automatic regulation of a single boiler; unless suitable precautions be taken, total load soon becomes divided unevenly between several boilers; various systems are described and it is concluded that there is a great future for automatic operation in Germany.

Combined Pulverized-Coal and Stoker Firing. Pulverized Coal Takes Fluctuations in a Stoker Fired Plant. Power, vol. 66, no. 20, Nov. 15, 1927, pp. 733–735, 6 figs. Application of pulverized-coal burners in combination with existing stoker equipment.

Gas-Fired. Gas-Fired Steam Boilers, A. B. Greenleaf. Chem. & Met. Eng., vol. 34, no. 9, Sept. 1927, pp. 566–568, 8 figs. Study of economics involved; there are two principal types of gas-fired boilers in general use; cast-iron type is limited to use for comparatively low pressures, while steel firetube type can be used over practically entire range of working pressures.

Water Walls. Boilers with Water Walls for Industrial and Isolated Power Plants, K. Toensfeldt. Combustion, vol. 17, no. 5, Nov. 1927, pp. 293–297, 4 figs. Shows how presence of water walls in furnace not only makes possible higher ratings than may be obtained with old firebrick-lined furnaces, but also how their presence betters relative performance of boiler at same steaming rates.

BOILER OPERATION

Control. Tests with the Roŭcka Boiler Control (Versuche mit dem Feuerungsregler Roŭcka), W. Boltze. Wärme, vol. 50, no. 26, July 1, 1927, pp. 461–464, 5 figs.; and brief translated abstract in Eng. & Boiler House Rev., vol. 41, no. 4, Oct. 1927, p. 182. Complete Roŭcka system for automatic operation controls speed of combustion, pressure in combustion chamber, feedwater and fuel supply; results obtained from observations on boilers in power stations with fluctuating load; author concludes that automatic control makes possible considerable gain in efficiency, even in best conducted plants.

BOILER PLANTS

Instrument. Automatic Volume Control of Steam and Air, J. Wolfe. Chem. & Met. Eng., vol. 34, no. 9, Sept. 1927, pp. 562–565, 17 figs. Cites two examples: first is one in which continuous control of air for combustion in steam raising is used, while second is example of intermittent or cyclic control of air and steam for manufacture of blue gas or carburetted water gas.

BOILERS

Heat Transfer in. Large Boiler Units and Heat Transfer, A. Page. Power Engr., vol. 22, nos. 259 and 260, Oct. and Nov. 1927, pp. 377–380 and 425–427, 2 figs. Oct.: Thermal losses of modern boiler unit are analyzed. Nov.: Novel method of boiler construction by which chimney and radiation losses are claimed to be greatly reduced.

Kearny Station, N. J. Boilers at the Kearny Power Station, R. C. Burton. Combustion, vol. 17, no. 5, Nov. 1927, pp. 289–292, 4 figs. Babcock and Wilcox boilers are 48 sections wide, 20 tubes high by 21 ft. long, and superheater is located between upper and lower decks of boiler with six tubes between superheater and furnace; drop-leg construction is employed, two lowest rows of boiler tubes being placed approximately 20 in. below third row.

Marine. See MARINE BOILERS.

Selection. The Selection of Steam Boilers, W. A. Shoudy. Combustion, vol. 17, no. 5, Nov. 1927, pp. 285–288 and 302, 2 figs. Whether waste-heat or direct-fired boilers are to be installed, there is no rate which will completely govern their selection; author has attempted to point out certain paths of approach to problem and to offer few words of warning; there is not now, nor will there be, a universal type suitable for all needs.

Settings. Boiler Settings, G. E. Dignan. Engrs.' Soc. West. Pa.—Proc., vol. 43, no. 6, July 1927, pp. 279–302 and (discussion) 303–305, 12 figs. Points out how conditions can be met in practical and commonsense manner; deals more with larger installations, as conditions are more severe and lessons learned can be applied with profit and discrimination to smaller installations.

Increasing Height of Boiler Settings, H. B. Singleton. Power House, vol. 21, no. 20, Oct. 20, 1927, pp. 20–21, 3 figs. View is expressed that when boilers are set higher than it is customary and careful firing methods adopted they can be run with practically clean surfaces if tubes are cleaned every 10 or 12 hours.

Waste-Heat. Raising Steam by Waste Heat, F. J. Taylor. Colliery Guardian, vol. 135, no. 3485, Oct. 14, 1927, pp. 617–621, 9 figs. Deals with facilities available for producing steam by gas-fired or waste-heat boilers, and certain other means of turning waste heat to good account.

The Production of Steam from Waste Heat, A. J. Ebner. Chem. & Met. Eng., vol. 24, no. 9, Sept. 1927, pp. 572–574, 6 figs. Although waste-heat boilers of firetube type have been installed to operate at steam pressures up to 250 lb., greater number are in service at 150 lb. or less; combination of better heat recovery and low initial cost of equipment in an operation at moderate pressure usually outweighs benefits to be derived from high-pressure steam.

Waste Heat Boilers, J. B. Crane. Combustion, vol. 17, no. 5, Nov. 1927, pp. 303–306 and 310, 6 figs. Boilers for waste-heat purposes are horizontal return-tubular, horizontal or vertical water-tube; settings should be made heavier and more substantial with waste-heat than with regular boilers.

BOILERS, WATER-TUBE

Rational. A New Form of Water-Tube Boiler. Combustion, vol. 17, no. 5, Nov. 1927, pp. 297–299, 2 figs. New type of boiler, called Rational, has been developed in London; it has distinctive method of burning pulverized coal, in that it has a device which distributes coal in paralleled ribbons and this secures rapid and complete combustion.

BOLTS

Heat Treating. Low-Carbon Bolts Show Uniformly High Strength, E. F. Ross. Iron Trade Rev., vol. 81, no. 17, Oct. 27, 1927, pp. 1025–1027, 2 figs. That tensile strengths of low-carbon steel, containing up to 0.15 per cent carbon, could be increased 30 per cent simply by making extremely rapid quench was discovery of Roy H. Smith of Lamson & Sessions Co. at Kent, O.; numerous improvements which have been made during past two years are described.

BONUS SYSTEMS

Parkhurst Differential. Parkhurst Differential Bonus Plan, F. A. Parkhurst. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 377–380, 5 figs. Author establishes as general basis of control standard wage table which is prepared to suit local conditions and harmonize approximately with base hourly rates already paid each trade employee in industry at time he becomes associated with it; gradually, adjustments upward are made for those classes of work for which, due to one condition or another, base wage rate has been unreasonably low.

BRASS

Hot Rolling. Problems of Hot Rolling Brass, L. Kroll. Brass World, vol. 23, no. 10, Oct. 1927, pp. 325–326. Larger heats in casting shop result in more accurate mixing and easier work with molds; critical review of hot-rolling literature.

BROACHING MACHINES

Ward. The Ward No. 2 Broaching Machine. Brit. Machine Tool Eng., vol. 4, no. 47, Sept.-Oct. 1927, pp. 663–665, 5 figs. Single-pulley all-gear headstock not only enables speeding up of operation but permits of very easy direct motor drive when desired.

BRONZES

Porosity. The Porosity and Physical Properties of Bronze (Ueber die Porosität und die physikalischen Eigenschaften des Rotgusses), Reitmeister. Wärme, vol. 50, nos. 30 and 31, Aug. 1 and 8, 1927, pp. 526–530 and 539–542, 15 figs. Details of experimental foundry of German State Railway: solidification processes in bronze alloys; testing of molding sand; practical testing of bronze alloys; relations between chemical composition and segregation tendency; physical properties.

C

CABLEWAYS

Aerial. Aerial Tramways, F. C. Carstarphen. Am. Soc. Civ. Engrs.—Proc., vol. 53, no. 9, Nov. 1927, pp. 2101–2182, 22 figs. Author aims at outline classification, together with such comments and formulas, that may be of service to engineers in determining elements of aerial ropeway for their needs; these formulas have been derived, checked, and used by author and are believed to be in correct and convenient form.

CAR DUMPERS

Cement Rock. Unusual Car Dumper Installation. Iron Age, vol. 120, no. 12, Sept. 22, 1927, pp. 795–796, 2 figs. Machine rolls up slope, carrying car to elevation and avoiding need for sunken bin; to handle cement rock from railroad cars to the storage yard at the crusher plant of the Florida Portland Cement Co., Tampa, a car dumper has been installed having a number of unique features; it was built by Wellman-Seaver-Morgan Co., Cleveland.

CARS, FREIGHT

Braking Power. Proposed Revision of Braking Power for Freight Cars, F. K. Vial. Ry. Mech. Engr., vol. 101, no. 11, Nov. 1927, pp. 714–719, 5 figs. Irregularities are principal cause of wheel failures; simple remedy suggested.

CARS, PASSENGER

Aluminum. Aluminum Used Extensively in New C. & N. W. Suburban Cars. Ry. Mech. Engr., vol. 101, no. 10, Oct. 1927, pp. 665–667, 6 figs. Affords saving in weight of 5700 lb. per car; 120 cars equipped with Melcher-Hyatt roller bearings.

CASE-HARDENING

Lead Coating. Case Hardening: Lead Coating as Protection Against Absorption of Carbon (Einsatzhärtung: Verbleiung als Schutzschicht gegen C-Aufnahme), H. Graefe. Werkstattstechnik, vol. 21, no. 18, Sept. 15, 1927, pp. 521–523, 6 figs. Describes experimental studies, at Siemens-Schuckert plant, which led to development of process of lead coating of machine parts which are to be case-hardened; lead coating limits absorption of carbon by portions subject to tensile stresses.

Practice. Practice in the Carburization of Steel, J. D. Gat. Forging—Stamping—Heat Treating, vol. 13, no. 10, Oct. 1927, pp. 393–396. Factors which exert an influence on final product such as manner of packing, carburizing agents, energizers, etc.

CAST IRON

Abrasive Resistance. Abrasive Resistance of Cast Iron (Die Abnutzung des Gusseisens und ihre Beziehung zum Aufbau und zu den mechanischen Eigenschaften), Kühnel. Giesserei-Zeitung, vol. 24, no. 19, Oct. 1, 1927, pp. 533–541, 24 figs. Laboratory and field tests of cast-iron shoe brakes, valve rings, etc., showed that abrasive resistance of cast iron of ferritic structure is low; establishes relation between mechanical properties and abrasive resistance of cast iron; special study of grate bars, effect of fire and sulphur upon them.

Graphite in. Graphite in Gray Cast Iron (Der Graphit im grauen Gusseisen), P. Bardenheuer. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 9, no. 13, paper no. 86, pp. 215–225, 48 figs. partly on supp. plates. Significance of graphite in cast iron; theory of graphite separation; relation between crystallization of graphite and its form and distribution; influence of graphite formation on properties of gray cast iron; older and new methods of graphite separations.

Gray. Special Gray Iron for Diesel Engines (Veredelter Grauguss, besonders für Dieselmotoren), B. Schulz. Motorwagen, vol. 30, no. 29, Oct. 20, 1927, pp. 625–628, 4 figs. Composition and properties of special irons and iron alloys developed by large German and Swiss manufacturers (Krupp, Sulzer, etc.).

Spun-Sorbitic. "Spun-Sorbitic" Cast Iron. Foundry Trade Jl., vol. 36, no. 576, Sept. 1, 1927, p. 195, 2 figs. It is centrifugally cast and is product of new development in application of Hurst-Ball centrifugal-casting process to production of cylinder liners, piston-valve liners and other similar engine castings; designed to combine advantages of centrifugal casting process and low-silicon-content cast iron, having an "all pearlitic" structure for these purposes.

Strength of. The Strength of Cast Iron, J. E. Fletcher. Foundry Trade Jl., vol. 36, no. 570 and 571, July 21 and 28, 1927, pp. 69–72 and 89–92, 5 figs. Presents deflection in transverse tests; dominating influence of silicon and total carbon together, and importance of carbon and silicon proportions in (T. C. + Si) factor must have first attention when attempting to interpret analysis of cast iron in terms of its mechanical strength.

CASTING

Centrifugal. Centrifugal Castings for Locomotive Piston-Valve Bushings. Engineering, vol. 124, no. 3225, Nov. 4, 1927, pp. 580–581, 4 figs. Importance attached by locomotive engineers to centrifugal castings for piston-valve liners, is shown by fact that they are now frequently specified; process known as Spun-Sorbitic is new development of Hurst-Ball process; it enables casting, having relatively low silicon contents, ranging from 0.75 to 1.5 per cent; to be produced without incurring danger of chilled surfaces or hard spots; important feature of process is that casting is cooled from temperature immediately below solidification point by means of special type of wet-air blast; immediate effect of this special cooling treatment is to convert pearlite into sorbite.

CENTRAL STATIONS

Colfax, Pa. A Mine Mouth Power Station of 270,000 Kw., M. R. Scharff and W. G. Fens. Elec. Light & Power, vol. 5, no. 11, Nov. 1927, pp. 21–23. Colfax power station of Duquesne Light Co. is typical mine-mouth station; details of equipment.

England. The Lister Drive No. 3 Power Station, H. Dickinson. Liverpool Eng. Soc.—Trans., vol. 48, 1927, pp. 120–143 and (discussion) 144–150, 11 figs. Size of generating unit adopted was 25,000 kw.; turbine house is laid out for 5 turbo-alternator units, present section accommodating two of them.

Leipzig, Germany. The Leipzig-Süd Power Station (Kohlenstaubfeuerungs- und Hochdruckkesselanlage für das Elektrizitätswerk Leipzig-Süd), Röhmer. Wärme, vol. 50, no. 27, July 11, 1927, pp. 483–485, 8 figs. Station has been enlarged from 19,000 to 136,000 kw. capacity; high-pressure steam plant and pulverized coal are employed; lignite is taken by aerial cableway from pit to station where it passes through drying and pulverizing plant; coke is also used as fuel; three marine-type steep-tube boilers are provided. See brief translated abstract in Power Engr., vol. 22, no. 258, Sept. 1927, p. 353.

CHAINS

Manufacture. Heavy-Duty Chain Made by New Method. Iron Trade Rev., vol. 81, no. 15, Oct. 13, 1927, pp. 897–898 and 908, 3 figs. Drop-forging company in Worcester, Mass., has started production of weldless heavy-duty chain, patterned after design first worked out in connection with anchor chain for U. S. Navy; this new weldless chain develops on testing machine strength considerably greater than usual type of forged welded chain.

CHUCKS

Automatic. A New Automatic Machine. Automobile Engr., vol. 17, no. 232, Sept. 1927, p. 256, 1 fig. Describes novel design features of new No. 23A automatic chucking machine recently introduced by New Britain Machine Co., Conn.; particularly suited for irregularly shaped components, castings, forgings, etc.

COAL

Carbonization. Coal Utilization. World Power, vol. 8, no. 46, Oct. 1927, pp. 185–187. Papers read before British Assn. urge importance of pretreatment and chemical additions before or during coking, and need for further research toward improved methods of heat transmission in carbonization.

Pulverized. See PULVERIZED COAL.

COAL HANDLING

Car Unloaders. Car Unloader Doubles Capacity. Iron Trade Rev., vol. 81, no. 19, Nov. 10, 1927, pp. 1169–1170, 2 figs. Installation operated by railroad at Baltimore transfers coal from one carrier to another without degradation; feeder capable of handling 2200 tons an hour.

Measurement. The Lea "Cubi-Meter" of Continuous Measurement of Granular Materials, J. E. Lea. Indus. Mgmt. (Lond.), vol. 14, no. 10, Oct. 1927, pp. 361–363, 4 figs. Account of Lea system of recording weight of coal.

Pneumatic. Pneumatic Coal-Handling Plant. Engineering, vol. 124, no. 3221, Oct. 7, 1927, pp. 453–454, 14 figs. on supp. plate. Details of plant installed by J. and J. Colman at Carrow Works.

Power Plants. Coal and Ash Handling Plant at the New Stourport Power Station, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 14, no. 10, Oct. 1927, pp. 357–360, 5 figs. Outstanding features are transit silo and electrically operated system of narrow-gage transport in conjunction with cranes and band conveyors.

COLD STORAGE

Insulation. Insulation of Fruit Storage Houses F. G. Hechler. Agric. Eng., vol. 8, no. 9, Sept. 1927, pp. 249–251, 1 fig. Insulating materials and methods of heat transfer; gives tabular data on thermal conductivity of materials and relative insulating value of some air-storage constructions.

Perishable-Products Terminal. The New Philadelphia Perishable Products Terminal, H. D. Peltier. Ice & Refrigeration, vol. 73, no. 4, Oct. 1927, pp. 193–198, 13 figs. Description of modern plant erected at Philadelphia, Pa., by Baltimore & Ohio and Reading Railroad companies; equipped with latest improvements in cold-storage equipment; ample facilities provided for storage of perishable products of markets and general consumers.

COMBUSTION

Control. Operating Principles of the Smoot System of Combustion Control, D. L. Fagnan. Nat. Engr., vol. 31, no. 11, Nov. 1927, pp. 523–527, 5 figs. Fundamental operating principles of centralized combustion control; functions of different parts of apparatus and construction details; applications and operation under various service conditions.

COMPRESSED AIR

Leakage. New Method of Measuring Compressed-Air Leakage (Sur une nouvelle méthode de mesure des fuites d'air comprimé), G. Levy. Revue de l'Industrie Minérale, no. 163, Oct. 1, 1927, pp. 401–407, 6 figs. Reviews common methods of determining leakage from centrifugal and displacement compressor systems and proposes new grapho-analytic method of parallel tangents.

Measurement. Measurement of Compressed Air by the Air Orifice Method, G. J. Heimerl and W. Z. Lidicker. Wis. Engr., vol. 32, no. 1, Oct. 1927, pp. 10–11 and 32, 3 figs. In making a thesis investigation of an air-lift pump, writers found it necessary to measure compressed air used in operation of pump; standard orifice method was used with 6-in. drum.

CONDENSERS, STEAM

Surface. Final Devaporization of Steam in Surface Condensers, W. J. Dana. Power, vol. 66, no. 20, Nov. 15, 1927, pp. 747–749, 2 figs. Shows how to calculate surface necessary to condense remaining steam.

CONDUITS

Pressure. Steel Penstock Design by a Graphical Method, P. Bier. Eng. News-Rec., vol. 99, no. 16, Oct. 20, 1927, pp. 629–634. Charts used to determine proper thickness of steel plates, most efficient type of joint; weight and cost of pipe; both riveted and welded pipe included, also various working stresses.

COOLING TOWERS

Design and Operations. Construction and Operation of Cooling Towers (Construction des réfrigérants, et sur leur fonctionnement), T. J. Gueritte. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu, vol. 80, no. 3–4, Mar.-Apr. 1927, pp. 388–415, 13 figs. Covers elements of theory with use of psychometric charts, describing construction of hyperbolic and rectangular types, and showing performance of a few installations.

COPPER ALLOYS

Copper-Zinc. Physical Characteristics of Commercial Copper-Zinc Alloys, W. H. Bassett and C. H. Davis. Am. Inst. Min. & Met. Engrs.—Tech. Publication, no. 26, 1927, 16 pp., 12 figs. Data and plots are arranged to constitute summary, enabling one at a glance to see physical properties of copper-zinc alloys to 62 per cent; characteristics shown are tensile properties, hardness and grain size, both in picture and in numerical values.

CORE OVENS

Gas-Fired. Bakes Cores in Gas Furnace, R. G. Van Grundy. Foundry, vol. 55, no. 21, Nov. 1, 1927, pp. 851–854, 2 figs. Discusses numerous factors which should be given careful consideration by foundrymen. Abstracted from Indus. Gas.

CORROSION

Theory of. The Theory of Metallic Corrosion in the Light of Quantitative Measurements, G. D. Bengough, J. M. Stuart and A. R. Lee. Roy. Soc.—Proc., vol. 116, no. 774, Oct. 1, 1927, pp. 425–467, 11 figs. Object of research is discovery of satisfactory way of measuring corrosion of metals in water and dilute salt solutions, and use of it to test adequacy of newer electrochemical theory of corrosion as applied to such media.

COST ACCOUNTING

Industrial Plants. Cost Accounting for the Average Plant, P. M. Atkins. Indus. Mgmt. (N. Y.), vol. 73, no. 6, and vol. 74, nos. 1, 3, 4 and 5, June, July, Sept., Oct. and Nov. 1927, pp. 372–379, 51–53, 183–188, 203–208 and 282–286, 3 figs. June: Treats of accounting generally by explaining its uses and purposes and describes printed forms used with system; application of practical cost-accounting system to small industrial business. July: Material and labor cost control. Sept.: Scientifically organized expense manual. Oct.: Expense control and burden application. Nov.: Order costs and controlling accounts.

CRANES

Cable. Cable Cranes, J. M. Bernhard. Eng. Progress, vol. 8, no. 11, Nov. 1927, pp. 303–306, 5 figs. Radial cable cranes have one tower stationary, while other can travel round first on circular track; two such cranes were used by Dyckerhoff & Widmann A.-G. when building Great Century Hall at Breslau; stationary cable cranes consist of two towers of wooden or steel structure and carrying cable stretched between them, along which crabs with load hooks, buckets, or grabs, which can be hoisted and lowered, travel to and fro; loads can thus be taken up and deposited at any desired point of track.

Jib, Traveling. Level-Luffing Cranes at Bristol Docks. Engineering, vol. 124, no. 3225, Nov. 4, 1927, pp. 581–582, 2 figs. Three are quay cranes, other three being roof cranes; they are equipped with special type of squirrel-cage motor having high starting torque; level-luffing gear has been patented by A. H. Weedell.

CUPOLAS

Charging. Automatic Charging of Cupolas, H. A. Jahraus. Iron Age, vol. 120, no. 20, Nov. 17, 1927, pp. 1363–1366, 2 figs. Push buttons and limit and time switches control operation; coke and limestone handled in similar way at plant of Buick Motor Co.

Linings. The Lining of a Cupola, F. Russell. Foundry Trade Jl., vol. 37, no. 582, Oct. 13, 1927, pp. 24–25. It is claimed that monolithic linings are best; they should consist of mixture of hard, comparatively large refractory lumps with a most refractory clay or other satisfactory binding medium.

D

DIESEL ENGINES

Airless-Injection. A 1,500-Horsepower Diesel of the Solid-Injection Four-Stroke-Cycle Type. Power, vol. 66, no. 19, Nov. 8, 1927, pp. 695–697, 5 figs. Among other unusual features is speed of 300 to 350 r.p.m.; eight cylinders are 18 in. in diameter by 22-in. stroke, giving piston speed of 1283 ft. at 350 r.p.m.

Design. Modern Trend of the Diesel Engine with Respect to Low Weight per Horsepower, High Revolutions per Minute and High Mean Effective Pressure, O. D. Treiber. Soc. Naval Architects & Mar. Engrs.—advance paper, no 13 for mtg., Nov. 10–11, 1927, 13 pp., 16 plates. Considers study of light weight as pertaining to design which eliminates unnecessary weight of metals and increases stresses of specially selected metals to higher unit limits than is common in slower and heavier engines; investigation recognizes following conditions that affect actual operation of engine: effect of increase in molecular number during process of combustion and effect of temperature on specific heat of gases.

High-Speed. Tests with Dornier High-Speed Diesel Engines (Versuche mit schnellaufenden Diesel-Motoren von Dornier), L. Hausfelder. Motorwagen, vol. 30, no. 22, Aug. 10, 1927, pp. 501–505, 6 figs. Author points out need of high combustion velocity and of scientific studies to make possible systematic provision of such velocity; on basis of own experiments he feels that there are no longer any unconquerable difficulties in way of providing high combustion velocity; high-speed Diesel engines are more hampered by difficulties in getting in sufficient air without supercharging than by too low combustion speed; sufficient air and good turbulence are requirements; experiments on Dornier engine with speed up to 1091 r.p.m. showed better economy at higher speeds than at lower speeds; in this engine there is pump for each cylinder; these pumps have no suction but fuel is introduced through slots uncovered by plungers.

M.A.N. Test of a Two-Cycle Double-Acting Marine Diesel Engine, E. Nibbs and S. A. Gardner. Soc. Naval Architects & Mar. Engrs. —advance paper, no. 10, for mtg., Nov. 10–11, 1927, 12 pp., 14 figs. Tests carried out on M.A.N-type engine built for U. S. Shipping Board by New London Ship and Engine Co. to be installed in S. S. Wilscox, 9500-deadweight ton vessel of Oscar Daniels type.

Power Costs. Diesel Oil Engine Power Costs. Elec. News, vol. 36, no. 19, Oct. 1, 1927, pp. 30–33. Collection of data over several years from 98 plants having combined annual output of over 223,000,000 kw-hr. may be used to estimate cost per kw-hr. of a proposed plant.

Power Plants. How to Figure Diesel Plant Initial Costs, E. J. Kates. Power, vol. 66, no. 19, Nov. 8, 1927, pp. 697–698. Initial cost of 1000-kw. Diesel generating plant for industrial use, and of 1000-kw. Diesel-electric central station in dollars per kilowatt capacity.

U. S. Shipping Board. The Engines of the U. S. Shipping Board Diesel Conversion Program, R. D. Gatewood. Soc. Naval Architects & Mar. Engrs.—advance paper, no. 12 for mtg., Nov. 10–11, 1927, 6 pp. Diesel conversion program includes engines of all variations and, in addition, special features of design which are described, together with shop-test results an operating results at sea on such engines as are in service at time of writing.

E

EDUCATION, ENGINEERING

Curriculum. The Engineering Curriculum, H. P. Hammond. Jl. Eng. Education, vol. 18, no. 1, Sept. 1927, pp. 57–84, 9 figs. Summarizes number of more significant facts and conclusions concerning curriculum which have been gathered in course of investigation.

Graduate Study. Graduate Study in the Engineering Schools, D. C. Jackson. Jl. Eng. Education, vol. 18, no. 2, Oct. 1927, pp. 125–147 and (discussion) 148–158. Author enumerates grounds for responsibility of engineers; engineers are largely responsible for means of producing various commodities, and for modern transportation and quick intercommunication; on them rests responsibility for farther development. See also contribution by G. M. Butler, pp. 136–143, giving account of experiment in engineering education that University of Arizona is making; and contribution by C. S. Coler, pp. 144–147, on method employed by University of Pittsburgh; and discussion, pp. 148–158.

Teachers. A Brief Report and Impressions of the Summer School for Engineering Teachers at Cornell University and University of Wisconsin, H. P. Hammond. Jl. Eng. Education, vol. 18, no. 1, Sept. 1927, pp. 11–36. Brief comments, supplemented by excerpts from some of statements received from those who attended; general impression of those who attended or observed schools seems to be that work may be pronounced successful.

ELECTRIC FURNACES

British Practice. British Electric Furnace Practice, H. C. Dews. Elec. Times, vol. 72, no. 1876, Oct. 6, 1927, pp. 416–419, 5 figs. Operating costs; power supply; steel melting; melting mild steel; arc furnaces; electric pig iron; induction-type furnaces; Ajax Wyatt furnace; Ajax Northrup.

Melting. High-Frequency Induction Melting, D. F. Campbell. Elec. Rev., vol. 101, no. 2602, Oct. 7, 1927, pp. 607–609, 5 figs. Details of Ajax-Northrup high-frequency furnace. Abstract of paper read at Iron and Steel Inst.

ELECTRIC WELDING, ARC

Crane Construction. Arc Welding Applied to Crane Construction. Elec. World, vol. 90, no. 19, Nov. 5, 1927, pp. 934–935. 10-ton, 60-ft. span electric overhead traveling crane, fabricated entirely by means of arc welding, has been constructed by Cleveland Crane & Eng. Co., Wickliffe, O.

Railway Structures. Arc Welding for Railway Structures, G. D. Fish. Ry. Club of Pittsburgh—Official Proc., vol. 26, no. 8, Sept. 22, 1927, pp. 186–206 and (discussion) 206–208, 16 figs. Author claims that steady replacement of rivet by electric arc is a great economic movement which cannot be checked by skepticism as to dependability of process; results can be definitely controlled, and failures are as definitely preventable as they are in other engineering operations.

Rolled-Steel Fabrication by. Rolled Steel Fabrication by Welding Displaces Castings in Machine Construction, R. H. Rogers. Universal Engr., vol. 46, no. 4, Oct. 1927, pp. 27–29. Rolled steel is stronger pound for pound; readily fabricated by metallic arc welding; greater freedom in machine design; quicker production; final product superior.

ELECTRIC WELDING, RESISTANCE

Percussion. On Electric Resistance and Percussion Welding, T. Okamoto. Inst. Elec. Engrs. of Japan—Jl., no. 469, Aug. 1927, pp. 874–894, 24 figs. Solution of a differential equation expressing temperature at any time and distance along bar in butt welding is obtained; theory of percussion welding is developed; percussive welded joints of various metallic wires are drawn through dies several times and tested to show how they behave under this operation. (In Japanese.)

ENERGY

Thermal, from Tropical Seas. The Utilization of Thermal Energy from Tropical Seas (L'utilisation de l'énergie thermique des mers tropicales). Génie Civil, vol. 91, no. 9, Aug. 27, 1927, pp. 215–216. Outline of new scheme by C. Boggia for subterranean power station utilizing thermal energy of tropical seas; project involves a 100,000-kw. plant capable of producing 800 million kw-hr. per year; 70 boilers would be required.

F

FACTORIES

One- vs. Multi-Story. One-Story or Multi-Story Factories. Which Is Cheaper to Operate? T. S. Rogers. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 361–366, 2 figs. Comparison of two projects for same manufacturer, each having floor area of about 200,000 sq. ft., showed saving of over 25 per sq. ft. per year for one-story plant.

FANS

Centrifugal. Characteristics of Centrifugal

Fans, T. G. Estep and C. A. Carpenter. Engrs.' Soc. West. Pa.—Proc., vol. 43, no. 6, July 1927, pp. 306–316 and (discussion) 317–332, 16 figs. Information based on tests and manufacturers' data to show existing relationships which limit performance of a fan or blower of any given design; effects of some simple variations in this design; different operating characteristics of more prevalent types of fan, and effects of incorrect applications of fans.

The Theory and Design of the Modern Centrifugal Fan, S. C. Martin. Nat. Engr., vol. 31, no. 11, Nov. 1927, pp. 513–519, 8 figs. Relations of velocity and pressure; volume and horsepower; efficiencies; fan blades and casings; cut-off point; fan inlet; blast area; fans for mechanical draft.

FARM MACHINERY

Cotton-Harvesting Machines. New Cotton Harvesting Machines. Textile World, vol. 72, no. 16, Oct. 15, 1927, p. 55. Describes spindle-type cotton picker; stripper for upland cotton; new cleaner.

FLIGHT

Test-Data Reduction Chart. The Reduction of Flight Test Data to Standard Atmosphere Conditions, J. D. Blyth. Flight, vol. 19, no. 43, Oct. 27, 1927, pp. 750b–750d, 2 figs. Presents reduction chart prepared with object of providing rapid and simple method of reducing data obtained on flight tests to conditions of standard atmosphere.

FLOW OF WATER

Coefficient of Roughness. Rugosity Coefficients of Water Channels (Rauhigkeits-Koeffizienten von ausgeführten Kanälen, im besondern von verkleideten und unverkleideten Stollen), J. Büchi. Schweizerische Bauzeitung, vol. 90, no. 13, Sept. 24, 1927, pp. 163–165, 9 figs. Value of κ in Kutter formula for concrete-lined and unlined tunnels (0.011 to 0.015 for first; 0.020–0.025 for second) of circular and other cross sections, also of paved trapezoidal canal.

FLUE-GAS ANALYSIS

Combustion-Air and CO_2 Determination. Alignment Chart for Determining Minimum Combustion Air and Maximum CO_2, C. A. Kulmann. Power, vol. 66, no. 19, Nov. 8, 1927, pp. 710–711. Chart is based upon equation for amount of CO_2 in waste gases when minimum amount of air is supplied and composition of fuel is known.

FLYING BOATS

Design. Floats and Flying-Boat Hulls (Schwimmer und Flugbootskorper), H. Herrmann. Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt, no. 14, Dec. 1926, pp. 126–152 and (discussion) 152–154, 71 figs. Characteristics and graphic presentation of water resistance; laws of similarity and model experiments; results of English tests; double-float machines.

Sikorsky. The Sikorsky S.36.B Amphibian. Flight, vol. 19, no. 42, Oct. 20, 1927, pp. 738–739, 3 figs. Sikorsky S.36 is a sesquiplan flying boat of short-hull variety, tail surfaces being carried, not on hull, but by outrigger from main plane, braced from stern of hull by two struts; tail surfaces are thus entirely independent of boat, and being placed high, are well protected from damage when alighting or taking off, besides being located in line of thrust.

FOREMEN

Qualifications. Qualifications of a Foreman, W. J. Murphy. Boiler Maker, vol. 27, no. 10, Oct. 1927, pp. 284–285. Experience combined with understanding and appreciation of the men constitute greatest requirements for success as foreman. Paper read before numerous foremen's clubs.

FORGINGS

Heating Time. Graphic Charts for Determining the Heating Time of Forgings (Ofenkarten zur Ermittlung der Anwärmzeiten für Schmiedestücke), H. Freund. Maschinenbau, vol. 6, no. 17, Sept. 1, 1927, pp. 853–856, 8 figs. Heating time regarded as function of surface and volume of forging; derives formula containing three furnace constants, on basis of which charts for individual furnaces are made; gives also graphic charts for determining surface and volume of various structural shapes.

FOUNDRIES

Automobile Plants. Foundry Effects Substantial Savings, C. H. Vivian. Automotive Mfr., vol. 69, no. 7, Oct. 1927, pp. 5–9. At shop of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., most modern methods are utilized to produce 400 tons of motor castings daily; details of procedure in casting room.

French Automobile Foundry Employs Continuous System, V. Delport. Foundry, vol. 55, no. 19, Oct. 1, 1927, pp. 748–750 and 752, 6 figs. Details of continuous system of Citroën foundries at Clichy, France.

Future Design. An Engineer Visualizes Foundries of the Future, E. A. Custer, Jr. Foundry, vol. 55, nos. 20 and 21, Oct. 15 and Nov. 1, 1927, pp. 791–792 and 815, and 844–846. Oct. 15: Account of imaginary tour of plant where castings are made in manner radically different to methods which prevailed up to 1927; melting apparatus and control mechanism based upon modern ingenious theory. Nov. 1: Methods and equipment connected with handling sand, molds and cores, theory and practice of pouring iron and cleaning castings.

Westinghouse Manufacturing Co., Hamilton, Ont. Foundry Methods in Westinghouse Plant, E. G. Brock. Can. Foundryman, vol. 18, no. 10, Oct. 1927, pp. 7–11, 6 figs. Up-to-date foundry equipment and efficient methods enable Hamilton ferrous and non-ferrous foundries to economically turn out castings varying from an ounce to many tons.

FRICTION

Contact of Flat Surfaces. Contact of Flat Surfaces, F. H. Rolt and H. Barrell. Roy. Soc.—Proc., vol. 116, no. 774, Oct. 1, 1927, pp. 401–425, 10, figs. Measurement of film thickness has been made by two methods; first, called area method, depends upon measurement of area attained by known volume of liquid placed between two flat surfaces which are wrung together, and therefore gives average thickness of a wringing film; second, called interferometer method, is based upon comparison of length of wrung combination of block gages with sum of their individual lengths.

FUELS

Coal. See COAL; PULVERIZED COAL.

Oil. See OIL FUEL.

Research. Present State of Fuel Research in Germany and in France (Notizie sullo slato attuale degli studi sui combustibili in Germania ed in Francia), M. G. Levi and C. Padovani. Giornale di Chimica Industriale ed Applicata, vol. 9, no. 9, Sept. 1927, pp. 411–419. Review of recent work on coal distillation, low-temperature carbonization, water-gas synthesis, utilization of natural gases, long-distance gas supply, etc.

FURNACES, INDUSTRIAL

Gas-Fired. Furnaces Burning Manufactured Gas, A. J. Smith. Forgings—Stamping—Heat Treating, vol. 13, no. 10, Oct. 1927, pp. 403–404, 2 figs. Experiments on application of reversible regeneration as employed on gas-fired furnaces, give results showing high efficiency.

FURNACES, MELTING

Air Furnaces. Air-Furnace Practice, C. Kluijtmans. Foundry Trade Jl., vol. 36, nos. 576 and 577, Sept. 1 and 8, 1927, pp. 197–198 and 213–219, 25 figs. Results of experience with 15-ton hand-fired air furnaces; air-furnace design; composition of charge, and melting practice; oxidation of constituents; influence of constituents on iron as cast; and on annealing; melting practice; temperatures, fractures and procedure; accidents.

Gas-Fired. Gas Economics of Brass Melting, J. F. Quinn. Gas Age-Rec., vol. 60, no. 17, Oct. 22, 1927, pp. 617–620. Discusses problems of gas-fired brass-melting furnaces, among which are the development of a refractory to better meet certain specific conditions, the effect of reflecting surfaces of flame temperatures on melting, etc.

G

GAS ENGINES

Steam Turbine, vs. Gas Engines vs. Steam Turbines (Gasmaschine oder Dampfturbine), F. Bartscherer. Archiv für das Eisenhüttenwesen, vol. 1, no. 4, Oct. 1927, pp. 297–310 and (discussion) 310–312, 17 figs. Deals with structural development of gas engine and improvements in heat utilization; heat requirement, operating and initial costs of gas-engined and of steam-turbine power plants: comparison of total costs.

GAS TURBINES

Exhaust-Gas. Exhaust-Gas Turbines Attached to Diesel Engines (Die Abgasturbinen hinter Dieselmaschinen), A. Oppitz. Werft—Reederei—Hafen, vol. 8, no. 19, Oct. 7, 1927, pp. 402–404, 10 figs. General summary of theoretical basis of combination and its application in practice.

Heat-Regenerative Cycles. Heat Regeneration and Regenerative Cycles, W. J. Walker. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. of Science, vol. 4, no. 22, Sept. 1927, pp. 526–530, 2 figs. Investigates possibilities in heat-regenerative cycles, particularly in relation to internal-combustion turbine development; new type of regenerative cycle is proposed, analysis of which indicates independence of turbine thermal efficiency on compression ratio.

GEARS

Flexible Tooth Form. A New Flexible Gear Tooth System, J. T. Wilkin. Am. Mach., vol. 67, no. 21, Nov. 24, 1927, pp. 809–810, 2 figs. Smooth, silent operation at high speed claimed for this modified tooth form of unconventional design; tooth has an extended root of parabolic form and extended addendum with rounded point.

Manufacture and Heat Treatment. The Manufacture and Heat Treatment of Gears, F. A. Brooks. West Machy. World, vol. 18, no. 10, Oct. 1927, pp. 471–475, 3 figs. Gear-tooth stress; manufacture of case-hardened gears; characteristic failures due to overstrain; microstructure; fracture at root of tooth.

Progress and Problems. Standardization of Gear Hobs Next on A.G.M.A. Program, P. M. Heldt. Automotive Industries, vol. 57, no. 18, Oct. 29, 1927, pp. 660–662, 2 figs. Project is inaugurated at meeting in Montreal; broadening of association's studies urged by President; review of technical paper presented.

Testing Machines. Gleason 90-Inch Bevel Gear Testing Machine. Am. Mach., vol. 67, no. 22, Dec. 1, 1927, p. 882. Machine for testing for quietness and proper tooth bearing of bevel gears up to 90 in. in diameter. See also Machy. (N.Y.), vol. 34, no. 4, Dec. 1927, p. 311, 1 fig.; and Iron Age, vol. 120, no. 22, Dec. 1, 1927, p. 1522, 1 fig.

Tooth-Rounding Machine. A New Automatic Gear Tooth Rounding Machine. Brit. Machine Tool Eng., vol. 4, no. 47, Sept.-Oct. 1927, pp. 653–655, 2 figs. Work is carried in special fixture on knee, and is indexed in front of cutter by means of special indexing arrangement, which provides for all sizes of gears having same pitch.

Worm. Worm Gear Inspection and Testing, G. H. Acker. Automotive Industries, vol. 57, no. 18, Oct. 29, 1927, pp. 662–663, 1 fig. Potential sources of error in worm gearing that must be guarded against by suitable inspection are: eccentricity and correct sizing of worm, index, head, and profile of worm thread, angle of gear, eccentricity of gear and silence.

GRINDING

Cylindrical. Speeding Up the Grinding Operation, H. Rowland. Can. Machy., vol. 38, no. 17, Oct. 27, 1927, pp. 15–17, 4 figs. Presents illustrations dealing with cylindrical grinding and covering wide variety of grinding machines; standard machines are used in practically every instance, but in many cases these have been slightly changed in order to adapt them to particular operations on a production basis.

GRINDING MACHINES

Double-End. A Churchill Double-End Grinding Machine for Rear Axle Casings. Brit Machine Tool Eng., vol. 4, no. 47, Sept.-Oct. 1927, pp. 660-661, 2 figs. New machine in which two wheel heads can operate simultaneously on two diameters to be ground, and by means of which the rate of output can be practically doubled.

Performance. Measuring Grinding Power (Die Messung der Schleifkraft), M. Kurrein. Werkstattstechnik, vol. 21, no. 20, Oct. 15, 1927, pp. 585–594, 22 figs. Scientific study at Charlottenburg Institute of Technology, of performance of circular grinding machine, with three-motor drive; relation between grinding pressure and hardness.

Radius. Micro Model 1G Internal Radius Grinder for Special Dies. Am. Mach., vol. 67, no. 20, Nov. 17, 1927, pp. 793–794, 2 figs. Accurate and smooth radii on drawing dies can be ground on this machine made by Micro Machine Co., Bettendorf, Iowa, designed to replace hand grinding or tooling.

Spindle. Machine Tool Spindle Grinder. Iron Age, vol. 120, no. 19, Nov. 10, 1927, p. 1316, 1 fig. Cincinnati Grinders, Inc., is placing on market special grinder developed from one of its standard machines and intended primarily for grinding of large machine-tool spindles.

H

HAMMERS

Plate-Spring. Recent Types of Laminated-Spring Hammers (Neuere Blattfederhämmer), H. Korzinsky. Werkstattstechnik, vol. 21, no. 18, Sept. 15, 1927, pp. 527–529, 6 figs. Descriptions of and data on spring hammer with adjustable eccentrics, patented "knuckle hammer," etc.

HEAT

Ambient, Utilization of. Utilization of Ambient Heat as a Motive Force (L'utilisation de la chaleur ambiante comme force motrice au moyen de la machine frigorifique), E. Guarini. Houille Blanche, vol. 26, no. 206, May–June 1927, pp. 73–77. Report to Fifth International Refrigeration Congress in which author proposes utilizing heat of atmosphere, oceans, etc., by means of refrigerating machines, in manner similar to the Dornig-Boggia and Romagnoli schemes.

Flow of. The Flow of Heat in a Body Generating Heat, J. H. Awberry. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. of Science, vol. 4, no. 22, Sept. 1927, pp. 629–638. Problem of temperature of all points and times, in sphere generating heat, is solved in detail, when constant initial temperature is given, surface being held at definite temperature from time-zero onward, and also for more elaborate case where initial temperature distribution is an equilibrium one, and boundary condition is Newton's law of cooling.

HEAT EXCHANGERS

Design. Numerical Design of Heat Exchangers (Die Berechnung von Wärmeaustauschern), E. Moeller. Gesundheits-Ingenieur, vol. 50, no. 40, Oct. 1927, pp. 747–750, 5 figs. Formulas and curves for various relations between directions of flow of the two liquids.

HEAT TRANSMISSION

Cylinder Walls. The Transfer of Heat in Cylinder Walls, A. Nägel. Engineer, vol. 144, nos. 3744, 3745, 3746 and 3747, Oct. 14, 21, 28 and Nov. 4, 1927, pp. 420–421, 459–460, 480–482 and 506–507, 13 figs. Abstract of four lectures: first two are devoted to development of methods of studying heat transfer in both steam and internal-combustion reciprocating engines, and are largely historical; in last two, author speaks concerning his own experiments and results; he has developed a new method of recording rapidly varying temperatures of working substances and of cylinder walls, and has applied method to a uniflow steam engine in his laboratory at Dresden.

Insulating Materials. Effect of Moisture on the Heat Transmission in Insulating Materials, L. F. Miller. Refrig. Eng., vol. 14, no. 5, Nov. 1927, pp. 141–144, 7 figs. Experimental results on insulating value of wood, cane, flax and rag felt as it is influenced by degree of moisture.

Prandtl Theory. Heat Transmission Between Fluid and Wall (La trasmissione del calore tra fluidi e pareti secondo la teoria moderna), A. Bernini. Nuovo Cimento, vol. 4, no. 5, May 1927, pp. 201–213, 2 figs. Historical review and exposition of theories from Fourrier to Prandtl; report on author's original experiments, undertaken in order to trace causes of discrepancies between theory and practice; discrepancies seem to be due to air bubbles and imperfections of wall surfaces; experimental determinations when corrected for these factors are in agreement with Prandtl theory of boundary surfaces.

Rates of Cooling and Heating. Simplest Method for Calculating Cooling and Heating Rates of a Plate (Einfachstes Verfahren zur Berechnung des Abkühlungs und Anheizvorganges in einer Platte), W. Matschinsky. Gesundheits-Ingenieur, vol. 50, no. 40, Oct. 1927, pp. 745–746, 1 fig. See also Vyestnik Inzhenerov, Sept. 1927, pp. 388–394. Derives approximate equations eliminating complicated Fourrier process and yielding results which may differ from Fourrier's by about 1–1.5%; numerical practical examples of rates of cooling and heating of walls and partitions of brick, wood and cork.

HEATING, STEAM

Central. Design of Lincoln Park Heating Plant Permits Future Power Generation, K. B. Castle. Power, vol. 66, no. 19, Nov. 8, 1927, pp. 692–694, 2 figs. Rochester Gas & Electric Corp. has under construction at Rochester a new high-pressure central heating plant that will ultimately deliver both steam and electric energy.

Overheating, Reduction of. Control Steam to Reduce Over-Heating, C. A. Thinn. Power House, vol. 21, no. 18, Sept. 20, 1927, pp. 30–34, 4 figs. Differential vacuum system proves solution of endeavor to reduce great loss of heat in buildings due to overheating in mild weather, bringing tangible savings in fuel consumption.

HYDRAULIC PRESSES

German. Hydraulic Presses (Hydraulische Pressen), A. Deutsch. V.D.I. Zeit., vol. 71, no. 45, Nov. 5, 1927, pp. 1578–1582, 11 figs. Principal modern types of German manufacture and their various uses in industry, including food industry, elevators, etc.

HYDRAULIC TURBINES

Relief-Valve Operation. Operation of Relief Valves in Hydro-Electric Plants. Power, vol. 66, no. 20, Nov. 15, 1927, pp. 761–762. Two general types are in use for relief-action turbines, governor-operated type and type which operates due to pressure rise in penstock; size of relief valves; closing time.

HYDRAULICS

Law of Similitude. Application of the Law of Similitude to Hydraulic Laboratory Research, G. De Thierry. U. S. Nat. Academy of Sciences—Proc., vol. 13, no. 9, Sept. 1927, pp. 684–688. While Froude began by applying laws of similitude to problems of naval architecture, Engels, of Tech. Univ. of Dresden, developed methods of research of constructions by hydraulic engineering; Krey, of Prussian Nat. Experimental Instn. for Hydraulic Eng. and Shipbldg., has extended Engels' investigations in applying methods of laboratory to special problem on the river Elbe; most valuable results obtained are his finding out, for special case he examined, relations between water and debris discharge.

HYDROELECTRIC DEVELOPMENTS

Conowingo, Maryland. The Conowingo Hydroelectric Development on the Susquehanna River, A. Wilson. Am. Soc. Civil Engrs.—Proc., vol. 53, no. 9, Nov. 1927, pp. 2295–2304 and (discussion) 2304–2319, 4 figs. Dam and power house are in Maryland, but upper half of reservoir and greater part of transmission lines will be in Pennsylvania; precipitation and run-off; maximum elevation of pool; dam and power house; progress schedule.

Ontario. Hydro-Electric Progress in Ontario. Can. Engr., vol. 53, no. 16, Oct. 18, 1927, pp. 465–469. Annual report of Ontario Hydro-Electric Power Commission deals with progress in electrical development in Province; extensions and improvements in various systems; extension of rural distribution systems.

Quebec. Development of Coaticook River, Que., E. E. Akhurst. Elec. News, vol. 36, no. 19, Oct. 1, 1927, pp. 27–30, 5 figs. Concrete-lined tunnel, 1550 feet long, driven through rock under town delivers water to two 1000-hp. units with head of 143 feet.

HYDROELECTRIC PLANTS

Automatic. Automatic Hydro Holds Lake Level. Elec. World, vol. 90, no. 19, Nov. 5, 1927, pp. 948–949, 2 figs. Electricity generated to carry investment charges on dam; energy sold on dump-power basis to Blue Ridge utility; resort expected to consume output ultimately.

California. The Melones Development, E. A. Crellin. Elec. West, vol. 59, no. 4, Oct. 1, 1927, pp. 218–222, 8 figs. Melones power house of Pacific Gas & Elec. Co., affords striking example of benefits of coöperation between power and irrigation interests with regard to use of water; this project was constructed jointly with Oakdale & South San Joaquin irrigation districts.

Small. Small Water Powers, F. J. Taylor. Elecn., vol. 99, no. 2575, Oct. 7, 1927, pp. 432–433. Suggestions for economical development; plant under 1000 hp.; preliminary surveys of sites; choice of turbines.

South Africa. The Sabie River Hydroelectric Power Station, A. M. Jacobs. S. African Engr., vol. 17, no. 112, Aug. 1927, pp. 3–11, 5 figs. Works comprise the dam and intake works; system for conveying water to power station, including three tunnels; two aqueducts with outdoor high-tension switchgear; 22,000-volt transmission line and telephone line; substation with outdoor high-tension switchgear at Sabie township; $2^1/_2$ miles of 3300-volt distribution line at Sabie, etc.

South Carolina. Re-Designing Catawba Station for Service on a Large Transmission System, W. S. Lee. Am. Soc. Civil Engrs.—Proc., vol. 53, no. 9, Nov. 1927, pp. 2245–2262, 13 figs. Redesign and reconstruction of first hydroelectric power station of Duke Power System in the Carolinas; this plant near Rock Hill, S. C., had original installation of eight rope-driven generators of 5600 kw. total capacity; after 20 years' operation of plant it was decided to raise dam 47.6 ft., and reconstructed plant is now operating under a maximum head of 70 ft.; new power-house installation consists of four vertical-shaft, waterwheel-driven generators of 60,000 kw. total capacity; current is stepped up to 100,000 volts for transmission.

I

ICE PLANTS

Oil-Engine Drive. Efficiency in the Oil Engine Driven Ice Plant, E. J. Kates. So. Power Jl., vol. 45, no. 10, Oct. 1927, p. 45. Points out that there is no reason why ice plant to be driven by oil engine cannot be made just as economical in its power requirement as that equipped with motor drive.

Power Economy. A Ton of Ice for Less Than Forty Kilowatt-Hours, E. P. MacNeil. Power, vol. 66, no. 20, Nov. 15, 1927, pp. 740–743, 3 figs. Fulton Ice Co., New York City, uses less than 40 kw-hr. per ton of ice over wide range of output and has actual kw-hr. consumption practically equal to maximum demand.

IMPACT TESTING

Boiler Plate. Impact Tests of Notched Specimens of Boiler Plate (Zur Durchführung der Kerbschlagprobe mit Kesselblechen), R. Baumann. Zeit. des Bayerischen Revisions-Vereins, vol. 31, nos. 16 and 17, Aug. 31 and Sept. 15, 1927, pp. 173–177 and 186–190, 22 figs. Study of experiments on effect of temperature on impact strength of various types of treated boiler plate; commends ordinary testing procedure, and sees no special advantage in more laborious tests recommended by German Society for Testing Materials.

INDICATORS

Electric. Electrical Indicators for High Speed Internal Combustion Engines, J. Obata. Imperial Academy—Proc., vol. 3, no. 7, July 1927, pp. 426–429, 3 figs. Devised for purpose of serving for general uses in laboratories; they contain no mechanical part which exhibits appreciable friction or inertia, and they are entirely free from influence of natural vibration of any part of system, so that they are especially suited for high-speed engines, in which ordinary indicators fail to give correct diagrams.

INDUSTRIAL MANAGEMENT

Budgetary Control. How to Budget Expenditures for Plant and Equipment, J. J. Berliner. Iron Trade Rev., vol. 81, no. 16, Oct. 20, 1927, pp. 957–961, 2 figs. Describes efficient method for recording plant and equipment expenditures.

Cost Accounting. See COST ACCOUNTING.

Production Control. A Visual Production Control System, L. D. Rowhaugh. Wood-Worker, vol. 46, no. 9, Oct. 1927, pp. 32–33, 4 figs. Designed for Udell Works, Indianapolis, Ind., which produces variety of articles in large volume, this system enables management to plan and control production intelligently, so that every job will go through economically and on scheduled time.

Controlled Production Reduces Costs, A. B. Kibble. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 373–376, 12 figs. Methods of Goodyear Co. which synchronize all manufacturing activities and result in lowered costs of operation.

Profit Sharing. See PROFIT SHARING.

Prosperity, Influence on. Management's Contribution to Prosperity in Industry, G. Dunn. Mech. Eng., vol. 49, no. 12, Dec. 1927, pp. 1285–1287. Author declares that modern management has sympathy of labor and confidence of capital; management's contribution to ultimate as distinguished from immediate prosperity.

Prosperity Maintenance and. Management's Part in Maintaining Prosperity, K. H. Condit. Am. Mach., vol. 67, no. 19, Nov. 10, 1927, pp. 731–732. Five things to which management may well give careful attention if prosperity is to be maintained are: accurate knowledge of costs, modernization of equipment, simplification and standardization, executive job analysis, and research.

Psychological Tests. See PSYCHOLOGICAL TESTS.

Purchasing. Cutting Your Inventory Costs, J. J. Swan. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 353–356, 12 figs. Methods for determining how long it takes to get material, whom to buy from and how to keep an adequate check on purchases, that there may be no shortages.

Shop-Usage Terminology. New Words for Old, M. J. McLaughlin. Taylor Soc.—Bul., vol. 12, no. 5, Oct. 1927, pp. 505–511. Attempt to find shop-usage substitutes for such words as "control," "authority," "science," "scientific," "psychology" and "psychiatry."

Standard Costs. Installing Standard Costs, G. C. Harrison. Mfg. Industries, vol. 13, no. 6, and vol. 14, nos. 1, 2, 3, 4 and 10, June, July, Aug., Sept., Oct. and Nov., 1927, pp. 425–428, 23–26, 111–116, 193–196, 269–272 and 367–368. June: Shows how to eliminate most of usual detail and time involved in distributing factory burden. July: How to compile labor and material standards. Aug.: Job-order method of cost accounting is rapidly giving away in progressive concerns to use of standard costs; great advantage is that latter provides valuable instrument of control for manufacturing executives from president to foreman. Sept.: Determining causes of lost profits. Oct.: Whys and wherefores of machine rates. Nov.: Points out absolute necessity of predicting results of operation in advance under modern business conditions.

Traffic Management. Traffic Management Lowers Costs, W. J. Bailey. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 339–342, 5 figs. Freight charges on materials coming into plant and on shipments of automobiles sent out to dealers are radically cut by study of rates, routes, maximum loading, and other factors, by Durant Motor Co. and other car manufacturers.

Values in. A Sense of Values in Scientific Management, A. B. Rich. Taylor Soc.—Bul., vol. 12, no. 5, Oct. 1927, pp. 511–513. Points out that scientific management should be more nearly comparable with science of medicine than with any other; this science utilizes great variety of knowledge; so with scientific management various sciences for knowledge of human nature, mechanics, economics, chemistry, metallurgy, are used.

INSULATION, HEAT

Thermal Constants, Measurement of. A Method for the Measurement of Thermal Constants of Heat Insulating Material, K. Kumabe. Soc. Mech. Engrs. of Japan—Jl., vol. 30, no. 125, Sept. 1927, pp. 395–399, 2 figs. On applying a sine-wave heating method for measurement of thermal constants of heat-insulating material, authors point out that pure sine thermal wave form on plane surface of sample is not necessary condition for application of this method, and only periodic wave is sufficient; they propose simple method on this principle for industrial purpose, and experimental result is given. (In English.)

INTERNAL-COMBUSTION ENGINES

Differential-Stroke. Differential-Stroke Internal Combustion Engine. Engineering, vol. 124, no. 3226, Nov. 11, 1927, pp. 613–615, 4 figs. Details of new engine, the Andreau motor, embodying differential stroke put on market by Citroën Gear Co., Paris; key to their design is employment of pair of Citroën gear wheels, by use of which relatively simple mechanism has been evolved, with further advantage that two crankshafts, revolving at different speeds, are available for power transmission; crankshafts are coupled by two-to-one gear, gear wheels being of Citroën double-helical type; chief gain in efficiency resulting from differential arrangement is obtained during this stroke, as its increased length, with respect to admission stroke, enables more complete expansion of gases to be utilized than is possible in normal engine.

Efficiency of. The Ideal Efficiency of Internal-Combustion Engines, W. T. David. Gas Jl., vol. 179, no. 3357, Sept. 21, 1927, pp. 695–696. Two suggestions are put forward in this paper—first, that ideal efficiencies of internal-combustion engines calculated upon basis of generally accepted specific heat and dissociation data are too low; and second, that ideal efficiencies increase with compression ratio at rate not only greater than that indicated by air standard, but also greater than that indicated by ideal efficiency calculations based upon usual specific heat data.

Exhaust-Gas Analysis. Exhaust-Gas-Analysis Calculations, E. H. Lockwood. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 571–572. Author has developed six algebraic formulas for calculating from exhaust-gas data information relating to air and fuel constituents of combustion; in using these formulas it is necessary only to insert numerical values of respective items as obtained from analysis; explains derivation of formulas and gives example of their use.

Small Two-Stroke. Small Two-stroke Engines. Eng. Progress, vol. 8, no. 11, Nov. 1927, p. 292, 2 figs. Zschopauer Motoren-Werke in Saxony have developed production of light two-stroke engines for driving vehicles and all kinds of stationary and portable machines; characteristic feature of these so-called DKW engines is cylinder which is provided with several ports near its center.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES.]

IRON AND STEEL

Bend Test. A Critical Study of the Bend Test as Applied to Iron and Steel, A. B. Kinzel. Am. Soc. Steel Treating—Trans., vol. 12, no. 5, Nov. 1927, pp 778–791 and (discussion) 791–793, 10 figs. Theoretical study of strains produced on bending a rectangular bar; from theory there is deduced a method for quantitative evaluation of a bend test; phenomena of inside crack is investigated and relation between tensile and bend elongation is discussed; specifications for routine quantitative bend testing.

IRON CASTINGS

Direct Metal for. How Ford Uses Direct Metal for Motor Castings, P. Dwyer. Iron Trade Rev., vol. 81, no. 12, Sept. 22, 1927, pp. 711–714, 8 figs. In process lately placed in force, blast-furnace metal and cupola metal in approximate proportion of 40 per cent of former to 60 per cent of latter are poured into 400-ton mixer; from mixer metal is removed 15 tons at time and dumped into electric furnace where it is raised to proper pouring temperature; it is taken from electric furnace in 1-ton ladles and distributed by monorail to various pouring stations.

IRON, PIG

Blast-Furnace Temperatures, Effect of. The Influence of Temperatures in Blast Furnaces on the Carbon Content of Gray Pig Iron (Der Einfluss der Temperaturen im Hochofen auf den Kohlenstoffgehalt des grauen Roheisens), A. Michel. Giesserei-Zeitung, vol. 24, no. 20, Oct. 15, 1927, pp. 567–569, 2 figs. Flake-graphite content of pig; influence of temperature and chemical composition of iron on carbon content; conditions governing production of carbon-poor iron.

Specifications. Propose Specification for Foundry Iron. Foundry, vol. 55, no. 21, Nov. 1, 1927, p. 846. Specification for foundry pig iron proposed by Federal Specifications Board.

L

LATHES

Turret. Heavy-Duty Turret Lathes. Iron Age, vol. 120, no. 19, Nov. 10, 1927, p. 1314. Rugged construction, intended to assure continued accuracy of entire machine, is among features of new Libby lathe which has been added to line of Int. Machine Tool Co., Indianapolis.

Warner & Swasey No. 3-A Turret Lathe with $3^1/_2$-Inch Bar Capacity. Am. Mach., vol. 67, no. 20, Nov. 17, 1927, pp. 789–790, 3 figs. Head and bed are cast solid from single piece of semi-steel.

LOCOMOTIVES

Caprotti Valve Gear. British Application of Caprotti Valve Gear. Ry. Engr., vol. 49, no. 574, Nov. 1927, pp. 397–398, 6 figs. Principles of this gear, with results of tests made on Lond., Midland & Southeastern Ry.; gear employs poppet valves operated by rotating cams evolved for purpose of improving thermodynamic performance of locomotive.

Coaling Stations. New Coaling Station Has 2400 Tons Storage Capacity. Ry. Age, vol. 83, no. 20, Nov. 12, 1927, pp. 939–940. Reinforced-concrete plant of New Haven at Cedar Hill serves locomotives on five tracks.

Cylinder Losses. An Investigation into the Cylinder Losses in a Compound Locomotive, E. L. Diamond. Instn. Mech. Engrs.—Proc., no. 2, 1927, pp. 465–479 and (discussion) 480–517, 10 figs. Investigation to ascertain what proportions of available energy of steam between boiler and atmospheric pressures are accounted for by various known sources of loss in engine, and to discover relationship between variation of these losses and conditions under which they occur.

Electric. See ELECTRIC LOCOMOTIVES.

4-8-4. New 4-8-4 Type Locomotives in Canada. Ry. Engr., vol. 49, no. 573, Nov. 1927, pp. 422–424. Engines placed in service on Canadian National Railways system represent advance of 20 per cent in tractive power over those of "6000" class which, at time of their introduction, were largest passenger locomotives in World.

4-8-2. 4-8-2 Type Locomotives for the Missouri Pacific. Ry. Age, vol. 83, no. 19, Nov. 5, 1927, p. 891. Built by American Locomotive Co.; they develop maximum tractive force of 63,665 lb.

Frames, Milling. Unusual Machine for Milling Locomotive Frames, S. Weil. Am. Mach., vol. 67, no. 20, Nov. 17, 1927, pp. 765–766, 3 figs. Openings in frames are milled from solid metal; two frames can be milled at same time; feeds are automatic in all directions.

High-Pressure. High Pressure Steam Locomotives, J. M. Taggart. Boiler Maker, vol. 27, no. 10, Oct. 1927, pp. 278–281, 3 figs. Discusses type of power best suited economically to utilize pressures of 800 pounds and over; the boiler of the future locomotive.

Oil-Electric. Oil-Electric Locomotive Tested in Passenger Service. Ry. Age, vol. 83, no. 19, Nov. 5, 1927, pp. 890–891. Erie 100-ton locomotive with four coaches maintains average speed of 33.4 m.p.h. from Hornell to Meadville.

Power Blow-Off. A Power Blow-off for Locomotives. Ry. Age, vol. 83, no. 18, Oct. 29, 1927, pp. 838–839, 3 figs. Bird-Archer Co. introduces attachment for operating locomotive blow-off cocks by power; device has two parts, power attachment proper and cab-operating valves.

2-8-8-2. D. & R. G. W. Buys Ten 2-8-8-2 Type Locomotives. Ry. Mech. Engr., vol. 101, no. 10, Oct. 1927, pp. 638–643, 5 figs. Maximum tractive force of 131,800 lb. at 70 per cent cut-off; weight on drivers 559,500 lb.

2-8-4. New 2-8-4 Type Locomotives for Freight Service on the Erie Railroad. Ry. & Locomotive Eng., vol. 40, no. 10, Oct. 1927, pp. 281–282. Booster-equipped, they develop 81,700 lb. tractive effort.

LUBRICATING OILS

Properties. Lubricating Oil from an Engineer's Point of View with a Note on Fuel Oil, F. G. Martin. Liverpool Eng. Soc.—Trans., vol. 48, 1927, pp. 65–75 and (discussion) 76–81, 2 figs. Notes on properties of fuel and lubricating oils and results.

LUBRICATION

Surfaces under High Loads. Lubrication. World Power, vol. 8, no. 46, Oct. 1927, pp. 184–185. Important outcome of investigations of National Physical Laboratory is fact that certain mineral oils will maintain themselves in film condition at temperatures in excess of limiting temperature of castor oil.

M

MACHINE TOOLS

Replacement Policy. Net Profit from Modern Machine-Tools, G. T. Trundle, Jr. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 532–534. Author suggests means of making necessary funds available by keeping reserve for depreciation of machine tools in form easily liquidated; mentions desirability of devising some formula that will determine time when obsolete machine tools should be replaced, and urges that some national organization study subject of reserve for depreciation and budgets for new equipment, thus endeavoring to improve conditions.

MALLEABLE CASTINGS

Cupola. Metal for Malleable Iron Fittings Melted in the Cupola, L. E. Gilmore. Foundry, vol. 55, no. 31, Nov. 1, 1927, pp. 840–843, 4 figs. Production of desired quality in cupola malleable requires careful control over details of cupola construction and daily preparation; blast used; quality and quantity of fuel; raw materials; mixtures; control of sands for molds and cores; details of annealing operation and effect of temperatures, time and rate of cooling.

Properties. Malleable Cast Iron (La fonte malléable), M. Guedras. Fonderie Moderne, vol. 21, Mar. 25, Apr. 10, June 25 and July 10, 1927, pp. 30–32, 58–61, 185–190 and 210–213, 8 figs. Chemical composition of primary and secondary metal; physical and mechanical properties; forging, annealing and welding; composition of pig used in manufacture of malleable; ferroalloys. June 25: Manufacture of primary metal; cupola and reverberatory furnace melting. July 10: Electric furnaces; comparison of thermal balances; triplex process.

MARINE BOILERS

Pulverized-Coal-Fired. Pulverized Coal

Tests of a Marine Water Tube Boiler, T. B. Stillman. Soc. Naval Architects & Mar. Engrs.—advance paper, no. 9 for mtg. Nov. 10–11, 1927, 12 pp., 12 plates. Babcock & Wilcox Co. has conducted series of experiments at its Bayonne plant using pulverized coal under marine boiler; gives results to date, and general statements of advantages and disadvantages of this method of firing coal as observed during these tests.

Test of Pulverized Coal as Applied to Scotch Marine Boilers, E. Jefferson and J. S. Evans. Soc. Naval Architects & Mar. Engrs.—advance paper, no. 8 for mtg. Nov. 10–11, 1927, 17 pp., 9 plates. Report of 240-hr. test of system which was developed and which is being installed in 9700-ton freighter, S. S. Mercer, in order to determine by actual operation real merits of pulverized fuel when applied to existing type of cargo vessels fitted with Scotch boilers.

MATERIALS HANDLING

Brick Factories. Cutting Costs to Third by Improved Methods of Handling Materials, J. Stuber. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 357–360, 7 figs. Camp Bros.' modern brick and hollow-tile plant shows how big savings can be made.

Economy in. Holding Down Handling Costs, G. E. Hagemann. Mfg. Industries, vol. 14, no. 5, Nov. 1927, pp. 369–372, 6 figs. What factors to investigate, and how to control methods used so as to get most dollar-value return, considered from standpoint of plant layout, materials handled and types of equipment in service.

Ford Organization. Organizing for Effective Transportation Within the Plant, H. J. Payne. Indus. Mgmt. (N. Y.), vol. 74, no. 4, Oct. 1927, pp. 212–217, 6 figs. Points out proper management is as essential in work of handling as in contact of other operations within plant; demand upon transportation equipment can only be made upon establishment of orderly, systematized flow of materials embracing needs of entire plant.

Tendencies. Tendencies in Material Handling, S. G. Koon. Iron Age, vol. 120, no. 19, Nov. 10, 1927, pp. 1293–1296, 2 figs. Combination of systems needed to fit most cases; increasing size of units; financial aspect.

MEASURING INSTRUMENTS

Dies and Gages. Measuring Machine Simplifies Laying Out of Dies and Gages. Am. Mach., vol. 67, no. 22, Dec. 1, 1927, pp. 843–844, 4 figs. National Cash Register Co., Dayton, Ohio, has built measuring instrument termed laying-out machine; by its use average laying-out time for work has been cut to approximately one-third of that taken by former methods, with added advantage of producing more accurate layout.

METALS

Structure. Crystallization and the Structure of Metals and Alloys (La cristallisation et la structure des metaux et alliages), A. Portevin. Societé Chimique de France—Bul., vol. 41, no. 8, Aug. 1927, pp. 961–987, 40 figs. Solidification structures of commercial and other alloys; number and size of crystals; structural effect of cold hammering and subsequent reheating.

MILLING MACHINES

Continuous Rotary. An "Archdale" Continuous Rotary Milling Machine. Brit. Machine Tool Eng., vol. 4, no. 47, Sept.-Oct. 1927, pp. 656–659, 4 figs. Duplex machine which embodies number of improvements and refinements in design.

Combined Drilling and. Melling "Mill-Drill-Matic" Machines. Am. Mach., vol. 67, no. 20, Nov. 17, 1927, pp. 792–793, 2 figs. Four distinct operations of straddle milling, or facing, drilling, removing burr from drilling operation, and reaming to size where drill diameter does not exceed $^7/_8$ in. in steel, can be performed simultaneously on No. 3 machine; No. 1 machine accomplishes machining of similar parts in smaller quantities with same degree of accuracy and efficiency as Mill-Drill-Matic No. 3.

Cutter Head vs. Cylindrical Cutter. Milling of Flat Surfaces with Cylindrical Cutter or with Cutter Head (Das Fräsen ebener Flächen mit Walzenfräsern und Messerköpfen). Maschinenbau, vol. 6, no. 19, Oct. 6, 1927, pp. 940–945, 16 figs. Comparative study of these two methods, as to time and quality of work, shows superiority of latter.

MOLDING MACHINES

Compressed Sand Packer. New Means of Sand Packing (Neue Wege der Sandverdichtung), O. Nagel. Stahl u. Eisen, vol. 47, no. 43, Oct. 27, 1927, pp. 1820–1821, 2 figs. Describes new type of compressed-air sand-packer molding machine, developed by Maschinenfabrik Durlach, which can at any time be adapted to any given kind of sand, for any given quantity and for any desired packing.

MOTOR BUSES

Maintenance and Design. Bus Maintenance and Design, P. V. C. See. Ry. Age (Motor Transport Sec.), vol. 83, no. 17, Oct. 22, 1927, pp. 814–817. Unusual methods of large electric-railway operator; improvements in construction proposed.

Urban. More Passenger Room Provided in New Urban Buses, D. Blanchard and J. W. Cottrell. Automotive Industries, vol. 57, no. 16, Oct. 15, 1927, pp. 569–572, 4 figs. Study of exhibits at A.E.R.A. show also reveals trend toward greater luxury in interurban jobs, and further increases in power-weight ratio; duralumin bodies.

MOTOR-TRUCK TRANSPORTATION

Railway Freight. Tractors and Trailers Used by North Shore Line. Ry. Age (Motor Transport Sec.), vol. 83, no. 17, Oct. 22, 1927, pp. 807–809. L.c.l. freight transported by motor vehicles from inland stations in Chicago to North-Side rail station.

MOTOR TRUCKS

Eight-Wheel. Scammell Eight-wheelers, Motor Transport, vol. 45, no. 1179, Oct. 17, 1927, pp. 449–452. Details of two new tractor and four-wheel trailer combinations, embodying novel method of back-wheel mounting.

Six-Wheel. Six Wheels Driven. Motor Transport, vol. 45, no. 1180, Oct. 24, 1927, pp. 491–494. Particulars of entirely new rigid six-wheeled F.W.D. chassis for cross-country or hard-road transport.

Storage-Battery. Storage-Battery Trucks (La traction sur route par accumulateurs), L. Krieger. Revue Générale de l'Electricité, vol. 22, no. 2, July 9, 1927, pp. 69–74. Data given indicate that overall economy of storage-battery-operated trucks is higher than that of gasoline trucks; tests on large and practical scale have established 100 watt-hours as power requirement of modern electric truck per ton-mile; comparative investment and operating costs are given for 3-ton trucks, covering per day average of 31 miles; with average cost of offpeak night current, electric truck is about 33 per cent less expensive operatively than gas car.

Three-Wheel Delivery. Small Delivery Truck (Kleinlastwagen), O. Lehmann. Motorwagen, vol. 30, no. 28, Oct. 10, 1927, p. 618, 1 fig. Data on German (D.K.W.) three-wheel automotive truck with motorcycle type of drive.

N

NOISE

Harmful, Elimination of. Protection Against Obnoxious Noises and Vibrations of Machines. Eng. Progress, vol. 8, no. 11, Nov. 1927, p. 291, 2 figs. Discusses vibration dampers which serve for isolating earth sound and preventing its propagation in low-frequency vibrations and high-frequency noises.

Reduction of. Progress of the Movement for the Reduction of Noise, H. J. Spooner. Soc. Indus. Engrs.—Bul., vol. 9, no. 9, Sept. 1927, pp. 13–25. Deals with three main aspects of noise question; namely: (1) noise in home; (2) noise in streets; (3) noise in workplace; hidden factors affecting efficiency. Includes bibliography and article by E. Pheby on pp. 22–25.

NUTS

Standard. Standard Bolt Heads and Nuts. Am. Mach., vol. 67, no. 19, Nov. 10, 1927, p. 747. Standards for bolt heads and nut sizes approved by Am. Eng. Standards Committee and intended to introduce national uniformity and to supersede all existing standards of bolt heads and nuts. Reference-book sheet.

O

OIL FUEL

Burners. Low Pressure Fuel Oil Burning Systems, H. L. Schultz. Indus. Mgmt. (N.Y.), vol. 74, no. 5, Nov. 1927, pp. 263–269, 6 figs. Practical suggestions for better efficiency; types of systems and their merits; fuel-oil specifications vs. system; location of pumps, blowers, etc.

The Parwinac Oil-Burning Apparatus. Engineering, vol. 124, no. 3224, Oct. 28, 1927, pp. 550–551, 5 figs. Claims of fuel economy are made for apparatus and that it is practically noiseless in action, can be used with any form of central-heating installation, and is entirely automatic.

OPEN-HEARTH FURNACES

Modern Types. Modern Open-Hearth Furnaces (Les fours Martin modernes), J. Seigle. Technique Moderne, vol. 19, no. 20, Oct. 15, 1927, pp. 641–647, 12 figs. General review of recent practice in design and operation of open-hearth furnaces in France, Germany and America.

OXYACETYLENE WELDING

Airplane-Frame Manufacture. Fabricating Frames for Airplanes by Oxyacetylene Welding. Iron Trade Rev., vol. 81, no. 15, Oct. 13, 1927, pp. 903–904, 2 figs. In its search for efficient fabrication method American aircraft industry determined upon oxyacetylene welding after much experimentation; tests in laboratories of United States government and of private concerns have proved conclusively that in this way strong vibration-resisting joint can be made with minimum of weight and with economy in labor and materials.

Theory and Practice. Theory and Practice of Autogenous Welding (Theorie und Praxis der autogenen Schweissung), C. F. Keel. Eidgenössische Materialprüfungsanstalt an der E.T.H. in Zurich, no. 11, May 1926, 52 pp., including discussion, 90 figs. Deals with raw materials, apparatus and tools; quality of welds; arrangement of seams; results of tests on welds; welding of cast iron; describes new welding method.

P

PARACHUTES

Salvator. Dorsal Parachutes (Paracadute Dorsali "Salvator" e le Modalita' di Collaudo di Essi), G. Gustosa. Rivista Aeronautica, vol. 3, no. 9, Sept. 1927, pp. 49–67, 21 figs. Construction, manufacture and use of Salvator parachutes; selection and methods of testing silk and other materials used; clock apparatus for retarded opening.

PIPE, CAST-IRON

Centrifugally Cast. Cast Iron Pipe Centrifugally Made Sand Molds, J. T. MacKenzie. Am. Iron & Steel Inst.—advance paper, for mtg., Oct. 28, 1927, 13 pp., 4 figs. Presents tabulation or results obtained by Professor Talbot on pit-cast and centrifugally sand-cast pipe. See also Iron Age, vol. 120, no. 19, Nov. 10, 1927, p. 1302.

POWER TRANSMISSION

Lubrication. Lubrication of Power Transmission Equipment, A. F. Brewer. Indus. Engr., vol. 85, no. 10, Oct. 1927, pp. 471–476, 6 figs. Lubrication of anti-friction bearings, gears, chain drive, etc.

Standard Initial Machine Speeds. Proposed Standards for Initial Machine Speeds, R. C. Deale. Am. Mach., vol. 67, no. 22, Dec. 1, 1927, pp. 835–838, 11 figs. Proposal originated in National Elec. Mfrs. Assn. and has been endorsed by Power Transmission Assn., with National Machine Tool Builders' Assn. coöperating; greatest possibilities probably lie in standardization of lineshaft speeds; it is believed that following set of definitions as to what constitutes initial speed of machine covers all possible types of drive: (1) coupled motor drive; (2) geared motor drive; (3) built-in-motor drive; (4) single-pulley belt drive; (5) cone drive; (6) motor drive through belts, chain, or equivalent.

Pulsating Loads. Methods of Handling Shock or Pulsating Loads. Indus. Engr., vol. 85, no. 10, Oct. 1927, pp. 477–480, 6 figs. Presents examples showing how interesting problems were solved in transmission of power when shock or pulsating loads were important factor to be considered.

PRESSES

200-Ton. 200-Ton Power Presses. Engineering, vol. 124, no. 3222, Oct. 14, 1927, p. 486, 2 figs. Press, with five tools arranged in line for finishing bars of laminated or leaf springs in cold, in a single machine with least possible movement in handling.

PROFIT SHARING

Ford Plan. The End of Ford Profit Sharing, S. M. Levin. Personnel Jl., vol. 6, no. 3, Oct. 1927, pp. 161–170. Tells story of its gradual

abandonment and sets forth various causes which precipitated this reversal of policy.

PSYCHOLOGICAL TESTS

Aptitude Tests. Determination of Vocational Aptitudes, H. D. Kitson. Personnel Jl., vol. 6, no. 3, Oct. 1927, pp. 192–198. Author is critical of methods of validation which rely on correlations between test score and proficiency on job, without consideration of scores made by a comparable but vocationally unselected group.

PULVERIZED COAL

Boiler Firing. Pulverized Fuel and Its Application to Boilers, R. B. Potter. Instn. Mech. Engrs.—Proc., no. 2, 1927, pp. 549–554. Summarizes advantages of pulverized fuel; discusses apparatus needed.

Regulating Excess Air in Pulverized-Coal Furnaces (Luftüberschussregelung von Kohlenstaubfeuerungen), T. Stein. Archiv für Wärmewirtschaft, vol. 8, no. 8, Aug. 1927, pp. 251–253, 4 figs. Description and practical performance of regulating device (AEG-Askania) whose operation is gaged by number of revolutions of pulverized-coal distributor and CO_2 content of smoke-stack gases.

PUMPS, CENTRIFUGAL

Axial-Flow. Low-Lift Axial-Flow and Centrifugal Pumps, H. R. Lupton and J. H. W. Gill. Engineering, vol. 124, nos. 3223 and 3224, Oct. 21 and 28, 1927, pp. 534–536 and 566–568, 13 figs. Investigation of relative incidence of losses in centrifugal and axial pumps are examined; determination of characteristics and losses.

Flow in. General Theorems on Flow in Centrifugal Pumps and Turbines (Allgemeine Sätze über die Strömung in Kreiselrädern und Turbinen), W. Müller. Zeit. für angewandte Mathematik u. Mechanik, vol. 7, no. 5, Oct. 1927, pp. 347–354, 4 figs. Review of recent theoretical work by Prasil, Mises, Kucharsky, and others, on basic dynamics equations of flow in turbines and centrifugal pumps.

Guarantees. Determining Centrifugal Pump Guarantees, G. H. Gibson. Power House, vol. 21, no. 18, Sept. 20, 1927, pp. 23–24. Meaning of velocity head in centrifugal-pump guarantees is explained and methods of making velocity-head corrections outlined, where areas of suction and discharge nozzles differ.

PYROMETERS

Optical. Optical Pyrometer and Distance Thermometers. Engineering, vol. 124, no. 3224, Oct. 28, 1927, p. 550, 2 figs. Instruments made by Siemens Bros. & Co., Woolwich, England; portable pyrometer is of disappearing-filament type.

R

RAILS

Surface Cracking. Surface Cracking of Rails in Service (La fissuration superficielle des rails en service. Technique d'étude des rails fissurés), A. Portevin. Revue Générale des Chemins de Fer, vol. 46, no. 9, Sept. 1927, pp. 263–275, 19 figs. Chemical and physical tests for determining character of temper and cold rolling of rails with view of correlating with surface cracking of rails in service.

RAILWAY MOTOR CARS

Gasoline-Electric. What the Gas-Electric Car Means to the Railroads, W. R. Stinemetz. Elec. Jl., vol. 24, no. 10, Oct. 1927, pp. 494–496, 1 fig. Points out advantages and savings effected by use of gas-electric car; multiple unit gas-electric trains.

Possibilities. The Possibilities of the Motor Rail Car, A. Guidoni. Ry. Age, vol. 83, no. 20, Nov. 12, 1927, pp. 929–932, 6 figs. Theoretical discussion of best vehicle for high-speed rail transportation.

RAILWAY OPERATION

Positive Meet System. "Positive Meet" System Effects Economy. Ry. Age, vol. 83, no. 18, Oct. 29, 1927, pp. 827–829, 1 fig. Operating method inaugurated by New York, New Haven and Hartford; under this system, schedule meeting points are arranged for and made by time table without use of unnecessary train orders.

RAILWAY REPAIR SHOPS

Locomotive. Steel-Frame Repair Shop for Locomotives; C. I. & L. Ry. Eng. News-Rec., vol. 99, no. 19, Nov. 10, 1927, pp. 759–761, 4 figs. Pit tracks served by 200-ton traveling crane and transfer table; heavy column design; transverse monitors.

RAILWAY SHOPS

Locomotives. Improved Rail Shop Methods, F. H. Colvin. Am. Mach., vol. 67, no. 19, Nov. 10, 1927, pp. 737–739, 6 figs. Improvements of methods and construction.

RAILWAY SIGNALING

Colored-Light Signals. Denver & Rio Grande Western Installs Its First Automatic Signals, B. W. Molis. Ry. Signaling, vol. 20, no. 11, Nov. 1927, pp. 415–417. Signal-department organization established, and 104 miles of single-track color-light signals completed during first year.

RAILWAY TRACK

Curve Resistance. Curve Resistance of Railway Vehicles (Untersuchungen über den Kurvenwiderstand von Eisenbahnfahrzeugen), M. Louis. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 18, Sept. 30, 1927, pp. 350–362, 21 figs. Analytical and graphical study of resistance of cars and locomotives of various wheel and axle systems at track curves; effect of centrifugal force.

Freight Train Curve-Resistance on a One-Degree Curve and a Three-Degree Curve, E. C. Schmidt. Am. Ry. Eng. Assn.—Bul., vol. 29, no. 298, Aug. 1927, pp. 1–30, 14 figs. Tests made with five freight trains; results relate exclusively to resistance of cars composing train and apply only to freight trains with four-wheeled trucks.

REAMERS

Sharpeners. Barber-Colman Reamer Sharpener. Am. Mach., vol. 67, no. 19, Nov. 10, 1927, pp. 754–755, 4 figs. Base of unit is of box-type construction with cross ribs for rigidity.

REFRACTORIES

Boiler Furnaces. Testing and Specification of Boiler Refractories (Prüfungen und Gütevorschriften der feuerfesten Baustoffen für Kesselfeuerungen), L. Lauber. Glückauf, vol. 63, no. 36, Sept. 3, 1927, pp. 1306–1310, 5 figs. Whereas temperature of combustion in old boilers rarely exceeded 1250 deg. cent. temperatures exceeding 1500 deg. are encountered where traveling grate or pulverized fuel is employed; Boiler Supervision Association of Mines in Dortmund district has undertaken investigations from results of which certain requirements have been laid down; principal methods of testing are explained and results given of tests on clay-bound silica bricks; latter gave excellent results in pulverized-fuel combustion chambers; tests include those for resistance to cracking by sudden quenching; for constancy of volume; tests of strength of bricks at high temperatures; and to determine resistance offered to attack by slag.

Magnesia. Magnesia Refractories for Steel Furnaces, G. M. Carrie and C. F. Pascoe. Can. Min. & Met. Bul., no. 186, Oct. 1927, pp. 1186–1272. Outlines occurrence of raw materials and indicates conditions under which finished product operates; nomenclature; uses; refractories available; applications; bibliography.

REFRIGERANTS

Methyl Chloride. Certain Physical and Chemical Properties of Methyl Chloride, H. J. Macintire, C. S. Marvel and S. G. Ford. Refrig. Eng., vol. 14, no. 4, Oct. 1927, pp. 115–120 and 138, 2 figs. Summarizes facts about this refrigerant pertinent to present uses; physical and chemical properties.

REFRIGERATING MACHINES

Automatic. Hazards of Automatic Refrigerators, W. R. Rilling. Contract Rec., vol. 41, no. 42, Oct. 19, 1927, pp. 1068–1069. Possibilities of danger that should be considered by every architect and contractor responsible for specifying or installing electric or gas cooling devices.

Manufacturing Cost. Manufacturing Cost, E. S. Schenck. Refrig. Eng., vol. 14, no. 5, Nov. 1927, pp. 139–140. Fundamentals apply to any variety of product but special reference is given to refrigerating machinery.

REFRIGERATION

Compression and Absorption. Compression and Absorption Cycles Combined, M. Pohlmann. Refrig. Eng., vol. 14, no. 5, Nov. 1927, p. 162, 2 figs. Presents theoretical card for combined process and diagrammatic arrangement of possible combined cycle. Translated from Kälte-Industrie, Aug. 1927.

Domestic. Household Refrigeration, C. C. Spreen and L. A. Philipp. Refrig. Eng., vol. 14, no. 5, Nov. 1927, pp. 145–149, 4 figs. Effect of compressor speed upon refrigerating capacity and efficiency in the case of small compressor.

ROLLING MILLS

Bar Mills. Bar Mill Designed Essentially for Alloy Steel Sections. Iron Trade Rev., vol. 81, no. 11, Sept. 15, 1927, pp. 662–666, 4 figs. Bar piling device at hot bed retards cooling of material and permits stack annealing.

Bearing Pressures. Measuring Pressures on Bearings of Rolling Machinery, P. H. Frank. Iron Trade Rev., vol. 81, no. 16, Oct. 20, 1927, pp. 965–967, 3 figs. Two methods have been developed to determine loads which anti-friction bearings must withstand.

Belt vs. Electric Drive. New Drives for Plate Rolling Mills (Neuartige Antriebe von Blechwalzwerken). Kruppsche Monatshefte, vol. 8, June-July 1927, pp. 121–125, 10 figs. Describes some recent mills with belt transmission instead of direct-coupled electric motor drive, as result of which great diameter and weight of flywheels is reduced to about one half or less.

Electric Drive. Electric Drive for the Reversing Mill at Margam Works. Iron & Coal Trades Rev., vol. 125, no. 3111, Oct. 14, 1927, pp. 563–564, 5 figs. Equipment consists essentially of 8000/18,000-hp. d.c. motor driving mill; Ward-Leonard motor-generator set for control of mill motor; exciter set; high and low-tension switchboards; switchgear for operation platform, and automatic slip regulator for a.c. motor of Ward-Leonard set.

Recent Developments in Electric Drives for Rolling Mills, L. A. Umansky. Am. Inst. Elec. Engrs.—Jl., vol. 46, no. 9, Sept. 1927, pp. 885–892, 12 figs. Electric drives, of capacities larger than encountered elsewhere, are usually designed to fit individual cases; special machines or special combinations of them are frequently used; several representative cases are outlined and methods of solving encountered problems are analyzed.

Four-High. Developments in Four-High Rolling, F. C. Biggert, Jr. Iron Age, vol. 120, no. 20, Nov. 17, 1927, pp. 1367–1370. Mill and roll design matured rapidly; roller bearings large factor; high tonnage output. Paper read before Iron & Steel Division of Am. Soc. Mech. Engrs.

Mannesmann Process. Fundamentals of Mannesmann Process (Grundsätzliche Betrachtungen zum Schrägwalzverfahren), E. Siebel. Stahl u. Eisen, vol. 47, no. 41, Oct. 13, 1927, pp. 1685–1691, 16 figs. Mechanical theory and metallographic studies of stresses and deformations induced by diagonal rolling give only qualitative picture; further research on friction between rolls and rolled specimen and on similar problems of mechanics of rolling necessary to form quantitative picture of process.

Refractories for. Refractories and Four-High Mills. Iron Age, vol. 120, no. 20, Nov. 17, 1927, pp. 1370–1371. Review of papers read before iron and steel division of Am. Soc. Mech. Engrs.

Rolling and Flow of Solids. Flow of Solids When Rolled (Experimentelle Untersuchungen über den Materialfluss beim Walzen), N. Metz. Archiv für das Eisenhüttenwesen, vol. 1, no. 3, Sept. 1927, pp. 193–204, 52 figs. Experimental study, by committee on rolling mills of Soc. of German Iron Metallurgists on deformations of pieces of various forms in rolling through various phases; effects of non-uniform distribution of temperature, speed for rolling, etc.; internal stresses; discussion by members.

Soaking Pits. Soaking Pit Operates on Recuperative Principle. Iron Trade Rev., vol. 81, no. 9, Sept. 1, 1927, p. 501. Because of success of this type pit in France, trial installation was made at Donner Steel Co., Buffalo; it was designed and built by Chapman-Stein Furnace Co.

Wire and Rod. Study of Wire-Rod Rolling Mills (Etude sur les trains à fils), E. Richarme. Revue de Métallurgie, vol. 24, nos. 4, 5, 6 and 7, Apr., May, June and July, 1927, pp. 161–178, 255–277, 307–316 and 405–407, 3 figs. Diameter of rolled wire; quality of metal to be rolled; weight of blooms and billets; multiple rolling relation between section of rolled rod and tangential speed of cylinders; differences in dimension of rolled wire; determination of angular speeds of rolling mill; calculation of continuous mill; different types of mills; power of electric motors installed; rolling performance.

S

SEAPLANES

Design. Notes on Seaplane Design, J. C. Hunsaker. Instn. Aeronautical Engrs.—Jl., vol. 1, no. 9, Sept. 1927, pp. 29–31. As result of

author's experience, original single-float type with improved wing-tip floats has been found more rugged than twin-float type for use in flying school, gives better protection to propeller from spray, is cheaper in first cost and in maintenance, and is more suitable for catapulting; it is not suitable for high-powered seaplanes of short span; twin-float type has been found suitable for high-powered machines, for torpedo carrying, and for rough-sea work; small flying boat has been found dangerous for school work as compared with tractor type on floats; flying-boat type is necessary for very large machines when twin-float design becomes structurally weak and heavy.

SHEARS

Combined Punching and Shearing. Cleveland No. 2 Combination Punching and Shearing Machine. Am. Mach., vol. 67, no. 19, Nov. 10, 1927, p. 751, 2 figs. Punching, notching, shearing and splitting can be performed on this machine; attachment is also supplied for twisting bars.

Continuous Automatic. Machine Trims Sheets Automatically. Iron Trade Rev., vol. 81, no. 17, Oct. 27, 1927, p. 1031, 1 fig. Substantial reduction in labor cost and increased production are made possible in sheet and tin plate mills by means of continuous, automatic shearing machine placed on market by Streine Tool & Mfg. Co., New Bremen, O. See also Iron Age, vol. 120, no. 117, Oct. 27, 1927, pp. 1160–1161, 3 figs.

SHEET METAL

Machines for Working. Cutting and Bending Tools for Mass Production of Small Sheet-Iron Parts (Schnitt- und Biegewerkzeuge zur Massenanfertigung kleiner Blechteile), E. Eysen. Werkstattstechnik, vol. 21, no. 17, Sept. 1, 1927, pp. 489–492, 14 figs. Describes tools for making hinges and complicated parts of calculating machines.

Testing. Erichsen Sheet Tester (Die Erichsen-Blechprüfung), H. Kummer. Maschinenbau, vol. 6, no. 15, Aug. 4, 1927, pp. 764–767, 7 figs. Sheet-metal tester has for its object to determine suitability of material for pressing and drawing; materials-testing and pressing department of Bing Works at Nuremberg have carried out series of experiments to see whether indications of tester are dependable; they found good agreement between actual presswork results and indication of tester in one-third of cases.

SMOKE

Abatement. Some Hints on Securing Smokeless Combustion with Bituminous Coal, T. E. Landvoigt. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 10, Oct. 1927, pp. 607–611. If suitable equipment is used, and intelligently operated, smoke is unnecessary; if well-known principles of combustion are applied in practice, satisfactory results are readily obtainable with bituminous coal; three things necessary for complete combustion are air properly introduced and controlled, a suitable temperature, and a properly proportioned combustion chamber.

SPRINGS

Steel, Corrosion of. Protection of Steel Springs Against Corrosion. Mech. World, vol. 82, no. 2127, Oct. 7, 1927, p. 269. Discusses various methods for protecting springs, including: (1) painting; (2) oil finishing; (3) coating by molten metal, chiefly by tin; (4) electroplating; (5) non-metallic coating produced by boiling in special chemical solution often sold under trade name.

STEAM ACCUMULATORS

Application. Application of Steam Accumulators, G. Keeth. Chem. & Met. Eng., vol. 34, no. 9, Sept. 1927, pp. 560–561, 2 figs. Writer's impression and observations on application of accumulators to industrial power plants.

Ruths. Ruths Accumulator in the Paper Industry. Paper Trade Jl., vol. 85, no. 17, Oct. 27, 1927, pp. 74–76, 5 figs. Far-reaching effect of accumulator upon operation of pulp and paper mill shown to good advantage at new plant of Price Bros. & Co., Ltd., at River Bend; other installations in United States and Canada.

STEAM ENGINES

Extractions. Extraction Engines. Power Engr., vol. 22, no. 260, Nov. 1927, pp. 412–414, 5 figs. Describes control systems in use in connection with extraction engines, with references to economies obtainable by engines of this type.

Single-Cylinder Extraction Engine. Engineering, vol. 124, no. 3224, Oct. 28, 1927, p. 550, 6 figs. on p. 554. Engine designed to meet wide variation in conditions; made by Maschinenbau, A.G., Silesia.

Uniflow. The Compound Uniflow Marine Steam Engine (Die Gleichstrom-Verbund-Schiffsdampfmaschine), J. Stumpf. Werft-Reederei-Hafen, vol. 8, no. 12, June 22, 1927, pp. 245–249, 14 figs. New installation based upon compound uniflow principle and designed economically to accommodate current tendency toward steam of higher pressures; designed as compound engine with cylinders of Woolf type and balanced piston valve intermediate between each set of high-pressure and low-pressure cylinders, arrangement has extremely low clearance volume; relative steam consumption of new design, Bauer-Wach system, and Lentz engine are considered. See brief translated abstract in Mar. Engr. & Motorship Bldr., vol. 50, no. 600, Aug. 1927, p. 316.

STEAM GENERATION

Submerged Combustion. Steam Generation—Submerged Combustion, N. Swindin. World Power, vol. 8, nos. 45 and 46, Sept. and Oct. 1927, pp. 128–132 and 189–196, 14 figs. Submerged combustion is inversion of present-day practice in steam generation and evaporation; history and development of burners in which fuels can be consumed in contact with water and other liquid. Oct.: Brunler and Hammond systems; influence of law of partial pressure on temperature and pressure of mixture of steam and gas; behavior of steam-gas mixture when expanding in steam-engine cylinder; thermodynamics; difficulties in adapting submerged combustion boiler to steam power.

STEAM GENERATORS

High-Pressure. Development of High-Pressure Steam Generators with Indirect Firing (Die Entwicklung von mittelbar beheizten Hochdruckdampferzeugern unter besonderer Berücksichtigung des neuen Schmidt-Hochdruck-Sicherheitskessels), O. H. Hartmann. Elektrotechnik u. Maschinenbau, vol. 45, no. 18, May 1, 1927, pp. 357–367, 9 figs. Historical sketch and details of Schmidt, Ruths, Benson and other types of high-pressure steam generators, of 56 to 225 atmospheres pressure, fired indirectly by hot gases.

STEAM METERS

Control. Steam Metering and Control, H. M. Hammond. Chem. & Met. Eng., vol. 24, no. 9, Sept. 1927, pp. 569–571, 5 figs. Meters recording steam flow and air flow should be installed on each boiler not only to show distribution of load on boiler, but to guide firemen in controlling rate of fuel feed, air supply, etc., to generate required amount of steam most efficiently.

STEAM PIPES

Developments. Modern Developments in the Steam Piping Field, A. B. Williams and C. W. Welch. Chem. & Met. Eng., vol. 34, no. 9, Sept. 1927, pp. 547–550, 4 figs. Design of high-pressure plants; flow diagram; standards for fittings and pipe flanges; materials.

STEAM POWER PLANTS

Combined Power and Process. Balancing Process Steam and Power in a Coated-Fabric Plant, L. C. Cooley. Chem. & Met. Eng., vol. 34, no. 9, Sept. 1927, pp. 551–553, 3 figs. Story of production and use of steam for process and power; unique arrangement developed and applied to control of steam and power generation.

Turbine Loading Schedules. Large Economies Result from Using Steam-Turbine Loading Schedules, A. R. Haynes. Power, vol. 66, no. 13, Sept. 27, 1927, pp. 462–465, 5 figs. Study of operating schedule built up from water rates of units; typical case of station with four units is assumed, and operating data plotted to show characteristics of units and most efficient combination of loads.

STEAM TURBINES

Blade Erosion. The Erosion of Turbine Blading. Engineering, vol. 37, no. 3227, Nov. 18, 1927, pp. 651–652. Evidence now secured seems to show very definitely that, in general, it is water suspended in steam which is main agent of destruction; subject has been investigated experimentally by Brown, Boveri and Co.; in reaction turbines of ordinary type, erosion appears which would seem to be due to fact that moving blades fling out to wall of casing any moisture which separates out while steam expands through them.

By-Product Power from. Byproduct Power from Steam Turbines, C. B. Campbell. Chem. & Met. Eng., vol. 34, no. 9, Sept. 1927, pp. 554–559, 10 figs. Most of larger process industries can develop their own power at favorable unit cost by taking advantage of possibility of coordinating generation of steam for power and process.

Extraction. The Field and Limitations of Extraction Turbines, C. B. Campbell. Elec. Jl., vol. 24, no. 11, Nov. 1927, pp. 553–556, 2 figs. Speaking generally, bleeder-type turbine can be designed to fit into any plant having an electric load and demand for steam at pressure lower than that at which steam is generated; this statement is based upon fact that power can be developed by machine properly designed to expand this steam to required lower pressure; while this is true, it is by no means a simple problem in many cases to decide whether conditions imposed by local factors will permit bleeder installation that will be practicable and economical.

Gas Engines, vs. Gas Engines vs. Steam Turbines (Gasmaschine oder Dampfturbine), H. Wolf. Archiv für das Eisenhüttenwesen, vol. 1, no. 4, Oct. 1927, pp. 285–296, 8 figs. Points out that from purely economic standpoint, steam turbine is now on a par with gas engine, and if it becomes technically possible to reduce heat consumption of turbine to that of gas engine, then former will be superior to latter.

Ljungström. 10,000–14,000-kw. Ljungström Steam Turbine. Engineering, vol. 124, nos. 3220, 3223 and 3224, Sept. 30, Oct. 21 and 28, 1927, pp. 411–413, 507–508 and 542–545, 41 figs. Development of Ljungström turbines of high output; complete designs for 30,000 to 40,000-kw. unit have been worked out, but largest of new type as yet constructed is rated at 10,000 to 14,000 kw.; this is 3000-r.p.m. machine supplied to Leghorn power station, Italy.

Loading. Efficient Loading of Steam Turbines, A. R. Haynes. Power, vol. 66, no. 20, Nov. 15, 1927, pp. 730–732, 1 fig. Minimum water-rate curves; total steam and water rates for different combinations of units; when auxiliary valve may be opened.

Regulation. Regulation of Condenser Turbines (Die Regelung von Kondensationsturbinen), E. A. Kraft. Elektrotechnik u. Maschinenbau, vol. 45, no. 34, Aug. 21, 1927, pp. 685–689, 6 figs. Discussion comparing advantages and disadvantages of throttling and admission methods of regulation, illustrated with G.E. and A.E.G. designs.

Small. Small Steam Turbines, G. A. Orrok. Engrs.' Soc. of West. Pa.—Proc., vol. 43, no. 6, July 1927, pp. 267–272 and (discussion) 273–278, 4 figs. Author claims that small turbine is most advantageous; it is light and occupies very small space; rugged in construction and automatic in operation; economical in use of steam in proportion to price paid for it; requires little attention, and uses little oil; maintains its economies over a series of years.

The Small Steam-Turbine Unit for Industrial Requirements, G. Arrowsmith. Instn. Mech. Engrs.—Proc., no. 2, 1927, pp. 555–566, 1 fig. Type of unit generally found most suitable is small turbine running at comparatively high speed and driving through reduction gearing; in all cases where direct drive from rope pulley or on to lineshaft is required, and also for electrical power production where direct current is required, reduction gearing is essential; for a.c. supply, a turbine at 3000 r.p.m. directly coupled to alternator, may be employed.

Zoelly. Tests of a 11,000-KW. Zoelly Steam Turbine. Engineering, vol. 124, no. 3225, Nov. 4, 1927, pp. 379–380. Translation of a report, made by Stodola, on trials of steam turbine supplied by Escher, Wyes and Co. to Wehrden power station, and rated at 11,000 kw.

STEEL

Alloys. See ALLOY STEELS.

Carbon in. The Determination of Carbon in Iron and Steel According to the Barite Process (Ueber die Bestimmung des Kohlenstoffs in Eisen und Stahl nach dem Barytverfahren), G. Thanheiser and P. Dickens. Mitteilungen aus dem Kaiser-Wilhelm Institut für Eisenforschung zu Düsseldorf, vol. 9, no. 15, paper no. 88, pp. 239–245, 5 figs. For accurate determination of carbon in carbon-poor steels according to barite process, apparatus was developed with which it is possible at same time to carry out titrimetric and weight-analysis determinations.

Compression and Breaking Energy. Influence of Compression upon the Breaking Energy of Steel (Influence de la compression sur la fragilité de l'acier-Existence d'une limite de fragilité), P. Dejean and H. Le Chatelier. Académie des Sciences—Comptes Rendus, vol. 184, no. 4, Jan. 24, 1927, pp. 188–189. Investigation to determine what influence, if any, preliminary compression exerts upon energy necessary to fracture steel specimens under usual impact test. See brief translated abstract in Mech. World, vol. 82, no. 2128, Oct. 14, 1927, p. 295.

Etch Tests. Deep Etch Test for Iron and Steel, H. G. Keshian. Am. Soc. Steel Treat.—Trans., vol. 12, no. 5, Nov. 1927, pp. 689–727 and (discussion) 727–736, 30 figs. Describes

types of structure revealed by method; factors influencing results, such as method of melting, chemical composition, reduction of area, heat treatment, direction of fiber in steel, etc.; points out value and limitations of method based on relation of various etch structures to performance of steel in service as observed by author.

High-Grade. Results of Recent Research on Properties of High-Grade Steels (Neue Ergebnisse der Edelstahlforschung), W. Oertel. V.D.I. Zeit., vol. 71, no. 43, Oct. 22, 1927, pp. 1503-1509, 21 figs. Standardization and tests of steels in Germany and United States; treatment of structural, tool, and sewage steels; effect of hardening, annealing and testing temperatures on hardness and other mechanical properties of high-speed steels.

High Temperatures, Effect of. The Properties of Steel at High Super-Heat Temperatures, A. McCance. Liverpool Eng. Soc.—Trans., vol. 48, 1927, pp. 205-224 and (discussion) 225-240, 11 figs. Examination of temperature-strength curves for various steels; secondary effects of prolonged high temperature.

Properties. On the Properties of Steels, J. E. Howard. Am. Soc. Steel Treat.—Trans., vol. 12, no. 4, Oct. 1927, pp. 622-629 and 650. Discusses various physical properties of steel and their behavior under different conditions; some of points discussed are Poisson's ratio, Hooke's law, elastic limit, elongation and contraction of area, modulus of elasticity, coefficients of expansion.

The Relations Between the Properties of Materials and Their Structure, A. Pomp. Eng. Progress, vol. 8, no. 10, Oct. 1927, pp. 263-264, 2 figs. Points out that nature of structure is of great moment as regards machining of steel with cutting tools; original structure of steel is also of decisive importance for results obtained in hardening; influence of cementite structure on result of hardening; favorable results achieved with tempering.

Mechanical Properties. Significance of Shearing Resistance and Cohesive Strength in Tests of Materials (Die Bedeutung des Gleit- und Reisswiderstandes für die Werkstoffprüfung), P. Ludwik. V.D.I. Zeit., vol. 71, no. 44, Oct. 29, 1927, pp. 1532-1538, 16 figs. That shearing resistance and cohesive strength are most important mechanical properties of elastic materials upon which all other forms of strength depend, is shown by review of studies of recent tests and experiments on hardness, tensile strength, impact strength, fatigue, aging, etc., of steels and alloys.

Temper Brittleness. The Temper Brittleness of Soft and Semi-Hard Steels (Ueber Glüh- und Anlass-Sprödigkeit weichen und halbharten Stahl), J. Feszczenko-Czopiwski. Zeit. des Oberschlesischen Berg- u. Hüttenmännischen Vereins zu Katowice, vol. 66, nos. 9 and 10, Sept. and Oct. 1927, pp. 548-555 and 624-628, 3 figs. Character of temper brittleness and methods of determining it; means of prevention; relation between stretching limit and Brinell hardness; properties governing expansion of a material.

STEEL CASTINGS

Defects. Defects in Mild Non-Siliceous Steel Castings (Ueber einige Fehlererscheinungen bei der Herstellung von weichem, nichtsiliziertem Stahl), K. Kerpely. Centralblatt der Hütten u. Walzwerke, vol. 31, no. 37, Sept. 14, 1927, pp. 517-520, 5 figs. Descriptions of usually observed flaws; remedies such as adding alloys of titanium and aluminum, etc.

STEEL, HEAT TREATMENT OF

Automobile Parts. Heat Treating 20,000 Hubs and Piston Pins Daily, S. Thompson. Iron Trade Rev., vol. 81, no. 19, Nov. 10, 1927, pp. 1160-1161, 3 figs. Details of heat-treating department of Defiance Screw Machine Products Co.

Ball-Bearing Steels. Heat Treatment of Two Ball Bearing Steels, B. Kjerrman. Am. Soc. Steel Treat.—Trans., vol. 12, no. 5, Nov. 1927, pp. 759-777, 8 figs. Results of electric-resistance tests on two steels, one of common type, other with higher content of chromium and addition of molybdenum; by resistance measurements on water-quenched test specimens, it is shown that it is possible to determine quantity of alloying elements which are effective in hardening a given steel; per cent hardening efficiency may be lowered by addition of too great quantity of alloying elements; this testing method should then afford means of determining cheapest analysis for steel of definite mechanical properties with definite hardening methods.

Definitions and Functions. Some Facts About Heat Treatment, S. Dunn. Ry. Mech. Engr., vol. 101, no. 11, Nov. 1927, pp. 745-747. Definition; difference between iron and steel; function of heat treating; heat treating billets for forging, and in blacksmith shop; heating steel to critical temperatures; importance of accurate heat treatment.

Design Problems. Design from the Heat Treating Standpoint, G. M. Eaton. Am. Soc. Steel Treat.—Trans., vol. 12, no. 5, Nov. 1927, pp. 794-811 and (discussion) 811-813, 7 figs. Author stresses need for closer cooperation between metallurgist and mechanical engineer; gives some typical problems still unsolved because of lack of union; freight-car bolster spring is discussed, and suggestions offered for possible elimination of it.

Electric. Benefits Obtained from Electric Heat-Treatment. Elec. World, vol. 90, no. 19, Nov. 5, 1927, pp. 927-934. Annealing, carburizing, hardening and drawing in automatic electric furnaces speed-up production in Detroit automobile plants; heat-treating costs reduced and quality improved.

Railway-Shop Tools. Heat Treating Methods and Equipment Recommended for Railroad Shops. Ry. Jl., vol. 33, no. 10, Oct. 1927, pp. 21-23. Report of Committee of Am. Ry. Tool Foremen's Assn. on handling of railway repair tools requiring heat treatment; manufacture of and repairs to chisels, caulking tools, etc., high-speed machine tools, and reamers, taps, rivet sets, etc.

Rate of Heating. Heat Treatment and Metallography of Steel, H. C. Knerr. Forging-Stamping-Heat Treating, vol. 13, no. 10, Oct. 1927, pp. 420-422, 5 figs. Rate of heating.

Theory. The Constitution of Steel and Cast Iron, F. T. Sisco. Am. Soc. Steel Treating—Trans., vol. 12, no. 4, Oct. 1927, pp. 651-666, 10 figs. Study of theory of heat treatment; review of constitution of steel and cast iron from standpoint of stable equilibrium; solid solution of carbon in gamma iron, or austenite; discussion of grain growth of austenite above critical range.

STEEL, HIGH-SPEED

Tests. Comparisons of Impact and Slow Bend Tests of High Speed Steel, R. K. Barry. Am. Soc. Steel Treating—Trans., vol. 12, no. 4, Oct. 1927, pp. 630-634, 1 fig. Results of tests show that high-speed steel is harder after tempering at 1100 deg. than when tempered at 900 deg. fahr.; it will therefore have higher tensile strength and higher transverse breaking strength with maximum deflection which would tend to increase brittleness and to decrease deflection under slow bend; high-speed steel tempered at 900 deg. is tougher or more ductile than when tempered at 1100 deg. which was indicated by impact test.

STEEL WORKS

England. The Works of William Beardmore & Co., Limited, Mossend Steel Works. Foundry Trade Jl., vol. 37, no. 584, Oct. 27, 1927, pp. 61-62, 3 figs. Details of melting shop, section mills, cogging mill, bail-finishing plant; power station; plate mill; shearing plant, etc.

Power Application. Power Application in Steel Plant. Elec. World, vol. 90, no. 18, Oct. 29, 1927, pp. 877-882, 9 figs. New merchant mills in Gary works of the Illinois Steel Co. exemplify modern practice; highly developed methods speed production and improve quality of product.

Roller Straightening Machines. The Demag Roller Straightening Machines. Engineering, vol. 124, no. 3216, Sept. 2, 1927, pp. 295-296. In modern practice, bars are straightened by means of rollers by process similar to that employed in sheet-metal straightening machines; working time is then reduced to that required for one or two passages through rolls, second operation on press only being necessary in isolated cases; two distinct types of machine are employed, one having rolls supported on one side only, and other with rolls supported at each end between columns; these machines are manufactured by Deutsche Maschinenfabrik "Demag," of Duisburg.

STRESSES

Fillets and Holes, Produced by. Stress Concentration Produced by Fillets and Holes, S. Timoshenko. Int. Congress for Applied Mechanics—Proc., 1926, pp. 13-20, 13 figs. Study can be carried out either by analysis, photoelasticity, Lüders' lines or by fatigue test; all these methods are discussed.

SUPERHEATED STEAM

Industrial Applications. Application of Superheated Steam in Industrial Processes, F. G. Page. Chem. & Met. Eng., vol. 24, no. 9, Sept. 1927, pp. 575-576, 2 figs. Specific results are cited which constitute example of how superheat may be important factor in process work.

T

TERMINALS, LOCOMOTIVE

Norfolk & Western, Williamson, W. Va. Norfolk & Western New Terminals at Williamson, W. Va., O. V. Parsons. Ry. Jl., vol. 33, no. 11, Nov. 1927, pp. 18-21. Improvements which have been in progress over period of six years.

TEXTILE MACHINERY

Electric Drive. Applying Electric Drives to Textile Finishing Machines Where Speed Adjustment Is Required, W. H. Tate. Textile World, vol. 72, no. 16, Oct. 15, 1927, pp. 43-47, 4 figs. Machines may be operated as single units or in tandem; five driving systems available.

TEXTILES

Research. Résumé of the Year's Textile Research at the Bureau of Standards, C. W. Schoffstall. Textile World, vol. 72, no. 19, Nov. 5, 1927, pp. 103-107, 3 figs. Work extended into new fields. Publication approved by Directors of Bur. of Standards.

TOLERANCES

Skoda-Works System. The Tolerance System of the Skoda Works, N. N. Sawin. Am. Mach., vol. 67, no. 19, Nov. 10, 1927, pp. 721-725, 7 figs. System which was developed to replace "DIN" (German) system takes into account influence of errors in measurement; 4 grades with 31 classes of fit in all.

W

WAGES

Bonus Systems. See BONUS SYSTEMS.

Economic Aspects. The Economic Aspect of Wages, G. H. Shepard. Indus. Mgmt. (N.Y.), vol. 74, nos. 4 and 5, Oct. and Nov. 1927, pp. 224-229 and 289-296. Author traces theory of wages back to fundamental economic principles, and points out their practical significance in light of present-day problems. Oct.: Fundamental relationships between wages and production. Nov.: Newer conception of wages; its application and its effects.

WELDING

Cast Iron. The Welding of Gray Cast Iron (Stand und Nutzen der Graugusschweissung), W. Zimm. Giesserei-Zeitung, vol. 24, no. 20, Oct. 15, 1927, pp. 561-566, 16 figs. Judging quality of cast-iron welds according to metallographic analysis; welding with and without preheating; electric cold welding with electrodes of special alloy castings have given best satisfaction.

Electric. See ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE.

Oxyacetylene. See OXYACETYLENE WELDING.

Structural Form, Effect on. Effect of Welding upon Structural Form (Einfluss des Schweissens auf die Gestaltung), A. Hilpert. V.D.I. Zeit., vol. 71, no. 42, Oct. 15, 1927, pp. 1449-1458, 99 figs. Principal welding methods and their characteristics; substituting oxyacetylene or arc welding for riveting, flange connections and monolithic casting and modifications in structural form resulting therefrom; cites number of examples showing effect of welding on shape of bridge girders, steel tanks, steel towers, pipe joints, dynamo housings, etc.

WIND POWER

Motors. Wind Motors (Fonctionnement des roues eoliennes), F. Verdeaux. Revue Générale des Sciences, vol. 38, no. 19, Oct. 15, 1927, pp. 541-548, 7 figs. Mathematical theory of air motors and windmills with horizontal axis, their maximum and average mechanical efficiency, methods of operation, energy losses, etc.

WIRE DRAWING

Profile and Shaped Wire. The Drawing of Profile and Shaped Wire, J. D. Brunton. Wire, vol. 2, no. 11, Nov. 1927, pp. 379-382, 10 figs. It has been found that a straight carbon steel, when properly treated and subsequently cold worked to correct degree, compares very favorably in physical properties with a heat-treated alloy steel, and fulfils entirely requirements specified for a certain purpose; for mass production there is undoubted saving in getting profiles drawn.

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AERONAUTICAL INSTRUMENTS

Oversea Navigation. Aircraft Instruments for Oversea Navigation, V. E. Carbonara. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 528–531, 4 figs. Direction of motion and rate of speed are sole data needed for determining position of moving object after certain period of time, but at present there are no absolutely precise instruments on airplane for accurate determination of these two factors; factors that constitute unsatisfactory features of navigating instruments available for aircraft are discussed and present methods of using various types of instrument and comments upon their practicability for oversea position finding.

AIR COMPRESSORS

Turbo. New Turbo-Compressor Plant at Cymmer Colliery. Iron & Coal Trades Rev., vol. 115, no. 3115, Nov. 11, 1927, pp. 715–716, 3 figs. Compressor is of single-casing type, driven by mixed-pressure turbine of impulse type, designed to work with high-pressure steam of 200 lb. per sq. in. and with total temperature of 500 deg. fahr.

AIR HEATERS

Sectional. Foster Sectional Air Heater. Power Plant Eng., vol. 31, no. 22, Nov. 15, 1927, pp. 1231–1232, 2 figs. Plate-type heater, plates being held in position in casing by spacers.

AIRPLANE ENGINES

Air-Cooled. American Aircooled Aircraft Engines, E. E. Wilson. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 3, Aug. 1927, pp. 533–543, 6 figs. Details of Pratt & Whitney "Wasp" and "Hornet;" Wright "Whirlwind" and "Cyclone" engines.

Compression-Ignition. High-Speed Compression-Ignition Engine Research, H. B. Taylor. Automobile Engr., vol. 17, no. 235, Nov. 1927, pp. 466–470, 13 figs. Advantages compared with gasoline engine are summed up as follows: reduction in specific fuel consumption; utilization of cheap fuels of high flash point; reduction of fire risk; elimination of electric-ignition system; possibility of simple two-stroke operation. Offset against these advantages: increase of structural weight; lower power output per unit volume of cylinder capacity; need for some form of preheating of air.

Farman. Farman Inverted 550–700-Hp. Aviation Engine (Le moteur Farman inverse 550–700 cv.). Aérophile, vol. 35, no. 19–20, Oct. 1–15, 1927, pp. 314–317, 5 figs. This is 18-cylinder W-type engine arranged in three sets of six cylinders at angle of 40 deg.; dimensions are such that light gasoline without benzol or alcohol additions may be used; cylinders are cast en bloc in Alpax alloy and each cylinder is provided with separate jacket; valves are operated by single camshaft carrying four cams per cylinder.

Liberty. The Air Cooled Liberty Engine, N. H. Gilman. Aviation, vol. 23, no. 25, Dec. 19, 1927, pp. 1468-1470, 7 figs. Weight is less and it develops more power than water-cooled design; improvement in use of rotary induction system; increased lift and longer valve opening; better designed intake port; new design for cylinders, camshafts and housings, valves, springs and rocker arms; cylinder-assembly method.

Superchargers. Supercharged Engine Performance, Calculated and Actual, O. Chenoweth. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 508–515, 11 figs. Method of predicting power output of given aircraft engine equipped with direct gear-driven centrifugal supercharger; three superchargers of different ratings are considered for purpose of selecting one giving best all-round performance; effect of superchargers of various ratings on engine power output and effect of various factors on engine performance; conclusions reached are that, for all-round performance to definite altitude, an intermediate supercharger rating should be selected, and that performance of engines equipped with direct-driven centrifugal superchargers can be predicted with fair degree of accuracy by methods outlined.

Two-Cycle. The "Ajax" and "Atlas" Engines. Aviation, vol. 23, no. 23, Dec. 5, 1927, pp. 1351–1352, 3 figs. Two-cycle, eight- and six-cylinder, radial, aircooled, supercharged engines produced by Aircraft Holding Corp.; development from tests; effect of double system of intake and exhaust; absence of valves and valve mechanism; forced-feed lubrication system.

Valve Seats, Replacement of. Method of Installing Valve Seats Lengthens Life of Hisso Engine. Aviation, vol. 23, no. 24, Dec. 12, 1927, p. 1405. Method and tools used in replacing valve seats.

AIRPLANE PROPELLERS

Variable-Pitch. A Promising Variable-Pitch Airscrew. Aeroplane, vol. 33, no. 19, Nov. 9, 1927, p. 646, 1 fig. Successful series of tests was made by Royal Canadian Air Force on propeller designed by W. R. Turnbull; variation of pitch angle is controlled by small electric motor carried on, and in front of, hub, which rotates blades through suitable train of gearing.

AIRPLANES

Airfoils. Experiments on Airfoils with Aileron and Slot, A. Betz. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 437, Nov. 1927, 6 pp., 4 figs. Results of experiments on three airfoils to which rear portions, having chords respectively 1/4, 1/3, and 2/3 or total chord, are hinged so as to form ailerons, especial attention being given to shape of slot between aileron and main portion of airfoil.

Alignment. Alignment and Checking of Components, R. C. Taylor. Roy. Aeronautical Soc.—Jl., vol. 31, no. 203, Nov. 1927, pp. 1037–1049, 13 figs. Deals with certain methods of checking components for alignment; principles of lining up fuselage; method of supporting fuselages; checking alignment of various types of fuselages.

Avimeta. First French All-Metal Commercial Aeroplane. Flight, vol. 19, no. 46, Nov. 17, 1927, pp. 793–795. "Avimeta" A.V.M. 132 is 3-engined monoplane of same general type as Fokker F VII 3-m, but differing from that machine both constructionally and in several features of its design.

Blackburn Bluebird. The Blackburn Bluebird, Mark II. Aeroplane, vol. 33, no. 19, Nov. 9, 1927, pp. 650–654. Unlike all other two-seater light planes now on market, it has side-by-side seating for two occupants.

Control. The Arens Control. Aviation, vol. 23, no. 21, Nov. 21, 1927, pp. 1242–1243, 4 figs. Control mechanism designed to replace bell cranks and yet be light, positive and reliable.

De Havilland. A New De Havilland Aeroplane. Flight, vol. 19, no. 44, Nov. 3, 1927, p. 759. D.H. 61 is designed and built to order of Australian firm for use between Broken Hill and Adelaide; it is single-engine biplane fitted with Bristol Jupiter engine and has cabin accommodation for 6 to 8 passengers, as well as ample luggage space and considerable range at its cruising speed of 100 m.p.h.

Defects and Deterioration. Defects and Deterioration, W. G. Gibson. Roy. Aeronautical Soc.—Jl., vol. 31, no. 203, Nov. 1927, pp. 1050–1060. Deals with general defects and deterioration encountered during normal life of aircraft

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NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

without reference to actual breakages caused by crash, together with more general methods of overcoming or repairing such defects and deterioration.

Design. Problems in Transport-Airplane Design, C. N. Monteith. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 682–690, 9 figs. Major problems encountered in operation under contract of that portion of Transcontinental Air Mail line between Chicago and San Francisco; possible solutions for difficulties; comparison of relative advantages of monoplane and biplane for transport service.

Design Control. Control of Aircraft Design, E. W. Stedman. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 516–518. Difficulties experienced in regard to engineering features of control of civil aviation during period of 7 years are summarized; outline of formation of International Commission for Air Navigation subsequent to Great War; Canadian Air Board Act of 1919; I.C.A.N. minimum requirements of aircraft and engines for air-worthiness which are being worked to in Canada as closely as possible; suggestion is then made that regulations must make minimum requirements for strength and performance sufficiently great to allow for reasonable deterioration of structure and loss of engine power; effect of increasing load factors.

Flying Boats. See FLYING BOATS.

Gliders. Structural Details of German Gliders, A. Gymnich. Nat. Advisory Com. for Aeronautics—Tech. Memorandums, no. 439, Nov. 1927, 32 pp., 63 figs. Deals with wings; fuselage; landing gear; steering organs.

The Rhoen Glider Contest of 1927 (Technische Fortschritte beim Rhoen-Segelflugwettbewerb 1927), W. Huebner. V.D.I. Zeit, vol. 71, no. 49, Dec. 3, 1927, pp. 1717–1721, 22 figs. Descriptions of recent glider models, including one weighing only 35 kg.; also glider having wing, symmetrical in cross-section.

Kirkham-Packard. The Kirkham-Packard Racing Biplane. Aeroplane, vol. 33, no. 19, Nov. 9, 1927, p. 648. Biplane wings, of unequal span and chord are of multiply-spar construction, covered with two-ply spruce, and are attached to top and bottom lines of fuselage; engine cooling is by means of wing radiators.

Landing Brakes. Landing Brakes for Aircraft. Aeroplane, vol. 33, no. 22, Nov. 30, 1927, pp. 738 and 740. Important design features; American experiments and production; points to be considered in fitting brakes to machine.

Metal. Metal Aircraft Construction at Vickers. Flight, vol. 19, no. 37, Sept. 15, 1927, pp. 646–649. Vickers, Ltd., at their Weybridge works, have carried out long series of experiments, and evolved forms of duralumin construction; simplicity is keynote of design; forms of construction evolved are such that resulting structure is considerably lighter than corresponding wood structure, for same strength; basis of system is novel form of spar web. See also Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 440, Dec. 1927, 5 pp., 5 figs.

Military. English Aircraft Firm Builds New Biplane for the R. A. F. Aviation, vol. 23, no. 24, Dec. 12, 1927, p. 1409. Military equipment and fuselage construction; inspection facilitated.

The Curtiss Attack Plane. Aviation, vol. 23, no. 24, Dec. 12, 1927, pp. 1404–1405. Original Falcon developed into series of two-place observation and attack planes; armament speed and maneuverability of A-3 Falcon.

Rotating Wings. Another Rotating Wing Machine. Aeroplane, vol. 33, no. 22, Nov. 30, 1927, pp. 742 and 744. Designs and rights of "Helicogyre" acquired by British Air Ministry; separate engine and airscrew to give horizontal motion.

Spars. Metal Wing Spars. Aviation, vol. 23, no. 23, Dec. 5, 1927, pp. 1342–1346, 15 figs. Construction of deep, medium and shallow spars; cheap production, easy inspection and simple repair considerations; metal spar as quantity-production affair.

Tiger Moth. The D.H. "Tiger Moth." Aviation, vol. 23, no. 25, Dec. 19, 1927, pp. 1472–1473, 3 figs. Monoplane flies 186.5 m.p.h. at altitude of 20,000 ft. and lands at 60 m.p.h.; experimentation with very high speeds at reasonable cost; easily converted into seaplane; controls operated by stick and pedal; stick attached to crank which through rocker arm actuates ailerons by torque.

Wheel and Brake. The Bendix Wheel and Brake. Aviation, vol. 23, no. 22, Nov. 28, 1927, pp. 1286–1287. Complete brake and disk-wheel unit is now on regular basis.

Wheel Brakes. Wheel Brakes and Their Application to Aircraft, G. H. Dowty. Flight, vol. 19, no. 47, Nov. 24, 1927, pp. 810d–810f, 4 figs. Indicates nature of modifications to aircraft structure that are desirable in order that wheel brakes may be incorporated.

AIRSHIPS

British. The Airship R 100. Engineering, vol. 37, no. 3228, Nov. 25, 1927, pp. 692–693, 3 figs. Passenger-carrying airship of 5,000,000 cu. ft. capacity; it is 709 ft. in length and has maximum diameter of 130 ft., while displacement is 156 tons; hull is streamlined throughout, without any parallel portion; power plant will consist of six Rolls-Royce engines running on gasoline.

The First of Our New Airships. Aeroplane, vol. 33, no. 21, Nov. 23, 1927, pp. 694–696, 4 figs. Two ships for British Air Ministry, R 101 of steel tubing and unique framework; R 100 of duralumin with interchangeable and replaceable girder units; tube production; crew and passenger accommodations and control inside main hull framing; power from six Rolls-Royce Condor engines.

Rigid. Some Recent Developments in the Design of Rigid Airships, W. T. Sandford. Roy. Aeronautical Soc.—Jl., vol. 31, no. 203, Nov. 1927, pp. 1029–1036. Factors governing shape; loading; stresses in structure; structural arrangements; other considerations affecting safety; future development; increased knowledge of loading has led to development of more accurate methods of stressing which have indicated many improvements in structural arrangement, until it should now be possible to build a successful and economical commercial airship of a strength several times that of any previously constructed.

Semi-Rigid. A New British Semi-Rigid Airship. Flight, vol. 19, no. 46, Nov. 17, 1927, pp. 790–792. B.S.R. 1 of 1,000,000 cu. ft. capacity; fundamental feature of design is new form of "twin keel," mainly enclosed inside envelope in such manner as to reduce head resistance by avoiding as far as possible any projections causing unfair shapes; keel is constructed in form of two girders of duralumin; power plant consists of four main engines.

ALLOY STEEL

Manufacture and Properties. The Manufacture and Properties of Alloy Steels, H. C. H. Carpenter. Engineering, vol. 124, nos. 3228 and 3231, Nov. 25 and Dec. 16, 1927, pp. 688 and 785. Review of 4 Cantor lectures delivered at Roy. Soc. of Arts. Nov. 25: States extent of world's production of alloy steels; properties and uses of tungsten, chromium, and manganese steels. Dec. 16: Consideration of nickel, nickel-chromium and nickel-chromium-molybdenum steels; silicon, chromium-vanadium, tungsten-chromium and tungsten-chromium-vanadium steels.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Copper. See COPPER ALLOYS.

Corrosion-Resisting. Control of Corrosion—New Alloys, W. M. Mitchell. Indus. & Eng. Chem., vol. 19, no. 11, Nov. 1927, pp. 1253–1256. In considering production of new alloys development of any single alloys which is universally corrosion-resistant, or even approximately so, is improbable; most that can be expected is production of various alloys, or groups of alloys, which will have maximum corrosion resistance and hence be serviceable for use with some particular class of corrosive agents; points to be considered in developing new alloys.

Magnesium. See MAGNESIUM ALLOYS.

Nickel. See NICKEL ALLOYS.

ALUMINUM ALLOYS

Aluminum Bronze. See ALUMINUM BRONZE.

Casting. Observations on Casting Aluminum and Its Alloys, W. J. Clark. Foundry, vol. 55, nos. 21 and 22. Nov. 1 and 15, 1927, pp. 847–849 and 891–893, 9 figs. Views of practical molder on his experience with aluminum and its alloys; importance of gating.

Cindal. A New Aluminum Alloy, D. R. Tullis. Metal Industry (Lond.), vol. 31, no. 21, Nov. 25, 1927, pp. 487–490, 7 figs. Cindal is primarily intended as corrosion-resisting type alloy, but at same time possesses many new features which have not hitherto been applied to aluminum alloys; seawater-test results; subsequent treatment of test strips; influences which intensify corrosion; comparative results of degasified and undegasified alloys; effect of degasifying and microstructure.

Heat Conductivity. Heat Conductivity of Light Alloys (Sur la conductibilité thermique des alliages légers), C. Grard and J. Villey. Académie des Sciences—Comptes Rendus, vol. 185, no. 17, Oct. 24, 1927, pp. 856–858, 2 figs. Experimental study of aluminum-copper, and magnesium-copper-aluminum alloys, which may be used in engine construction, at various temperatures; calls attention to magnesium alloys.

Sand-Cast. The Strasser Sand-Cast Aluminum Alloy, Alneon [Ueber die Strasserschen Aluminum-Gusslegierungen (Alneon)], M. von Schwarz. Zeit. für Metallkunde, vol. 19, no. 10, Oct. 1927, pp. 390–395, 9 figs. Mechanical and physical properties, microstructure of high-strength aluminum zinc alloy; effect of casting skin.

Strength, Tensile. Influence of Casting on the Strength of Aluminum and Magnesium Alloys (Zwangsläufige Einflüsse des Giessvorganges auf die Festigkeitseigenschaften von Aluminium- und Magnesiumlegierungen und ihre Bedeutung für den Konstrukteur), G. Schreiber. Zeit. für Metallkunde, vol. 19, no. 11, Nov. 1927, pp. 456–458, 10 figs. Statistical, frequency-curve study of tensile strength and elongation of electron metal, various aluminum alloys and of steel and iron castings.

ALUMINUM BRONZE

Large Ingots, Making. Making Large Bronze Ingots, J. Strauss. Iron Age, vol. 120, no. 23, Dec. 8, 1927, pp. 1577–1581, 8 figs. Difficulties overcome in pouring and machining aluminum bronze; refinements necessary in heat treating and forging.

Properties. Aluminum Bronze, R. C. Reader. Foundry Trade Jl., vol. 37, no. 588, Nov. 24, 1927, p. 143. Deals with general properties; its tensile strength and elongation and further useful properties; aluminum-bronze golf clubs.

APPRENTICES, TRAINING OF

Milwaukee Plan. Results of Milwaukee Apprenticeship Plan, C. J. Freund. Machy. (N. Y.) vol. 34, no. 4, Dec. 1927, pp. 249–253. Program of apprentice training carried on by Milwaukee branch of National Metal Trades Assn. is expected, before many years have passed, to supply all skilled men required in this district by metal trades; it is aimed to provide not only mechanics, but also inspectors, foremen, draftsmen, and even engineers and shop executives; based on fundamental principle that all companies in district are jointly responsible for development of skilled men.

ASH DISPOSAL

Power Plants. Disposal of Ashes and Flue Dust in Power Houses. Indus. Mgmt. (Lond.), vol. 14, nos. 7 and 11, July and Nov. 1927, pp. 237–242 and 403–406 and 408, 14 figs. Collection and removal of furnace ashes and clinkers is carried out by well understood methods, while removal of finer flue ashes has only come to fore with use of small low-quality fuel and extensive employment of pulverized fuel.

AUTOMOBILE ENGINES

Detonation. Detonation, W. A. Watmough. Automobile Engr., vol. 17, nos. 229, 230, 231, 233, 235 and 236, June, July, Aug., Oct., Nov. and Dec. 1927, pp. 207–211, 260–263, 306–311, 385–388, 457–461 and 500–505, 74 figs. In anticipation of later evidence it can be stated that rate of pressure rise in enclosure synchronizes with flame travel, and latter in turn responds to resistance to its inflammatory progress; turbulent propagation of flame; flame travel in gasoline mixtures; true uniform propagation of flame. Radiation of energy; influence of engine design. Practical "effect" and theoretical "cause;" detonation dynamics; catalysis and detonation; transmission of detonative energy; classification of detonation theories.

Zoller. Supercharged Double-Piston Two-Stroke. Autocar, vol. 59, no. 1671, Nov. 11, 1927, pp. 1021–1022. Four-cylinder 750-cc. Zoller engine with supercharger incorporated in flywheel.

AUTOMOBILE MANUFACTURING PLANTS

Materials Handling. Handling Efficiencies Cut Cost of Automobile Production, A. J. Brandt. Can. Machy., vol. 38, no. 23, Dec. 8, 1927, pp. 17–24 and 38. New plant for manufacture of Pontiac sixes has efficient layout for economical flow of materials and production; no cross-flow anywhere in plant.

AUTOMOBILES

Acceleration Computation. Methods of Plotting Car Acceleration, P. M. Heldt. Automotive Industries, vol. 57, no. 25, Dec. 17, 1927, pp. 902–904, 5 figs. Pickup varies from moment to moment with speed acquired, to time elapsed since starting and to distance covered since start; distance acceleration and time-speed curves.

Beverley-Barnes. The Beverley-Barnes Car. Auto-Motor Jl., vol. 32, no. 46, Nov. 17, 1927, pp. 981–984. Straight eight of advanced design.

Bodies, Custom. Custom Body Costs Are Reduced by Small Run Orders, R. S. Grimshaw. Automotive Industries, vol. 57, no. 25, Dec. 17,

1927, pp. 910–911. Meeting particular tastes without undue expense; presenting line of distinctive models at very slight increase in selling price by cooperating with producers of custom-body jobs; fabric-model possibilities.

Brake Linings. Continuation of the 1922 Report on Brake-Lining Tests, S. von Ammon. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 551–570, 32 figs. Information on work done in this field since that time; summary and discussion of various test methods and equipment employed by brake-lining manufacturers and others in automotive industry; it is shown that some of test methods in use do not furnish basis for ready or fair comparison of different brake linings; proposals are made which it is believed should, with reasonably limited tests, give satisfactory picture of character of brake linings and comparison of their relative merits.

Calthorpe. The 12–20 Hp. Calthorpe Car. Auto-Motor Jl., vol. 32, no. 45, Nov. 10, 1927, pp. 961–963. Four-cylindered engine is monobloc construction with incorporated gearbox; it has side valves and detachable head.

Chrysler. Greater Power and Smoothness Built into Chrysler "80," A. F. Denham. Automotive Industries, vol. 57, no. 22, Nov. 26, 1927, pp. 786–789, 5 figs. Engine bore increased and 6.1 compression ratio made standard; new methods of counterweighting are adopted; bodies longer and lower.

Deterioration. The Mechanical Deterioration of Vehicles, H. M. Jacklin. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 635–638, 5 figs. Tells how four students at Ohio State University measured for 14 vehicles of various ages effect of wear on power production and fuel consumption; equipment used, procedure followed and results obtained.

Fiat. Fiat's New 91$^1/_2$ Cu. In. Racer Said to Develop 175 Hp., W. F. Bradley. Automotive Industries, vol. 57, no. 24, Dec. 10, 1927, p. 865. Turns over at 8000 r.p.m.; 12 cylinders in two parallel rows with two crankshafts united by spur gearing; plain instead of roller bearings; valves inclined in head; engine fires as double six; mechanical 4-wheel brakes operated by pedal through friction; servo mechanism and hand lever.

French, 1927. The Twenty-First International Automobile Show (La XXI Exposition internationale de l'automobile), C. Martinot Lagarde. Technique Moderne, vol. 19, no. 22, Nov. 15, 1927, pp. 717–724, 25 figs. Features of most interesting new French models of the 4-, 6-, and 8-cylinder types.

Kissell. Kissell Introduces New Eight-Cylinder Model with Sedan at $1895. Automotive Industries, vol. 57, no. 25, Dec. 17, 1927, p. 893, 1 fig. 8–80 four-door brougham; 248-cu. in. piston displacement; single-plate dry clutch and Warner transmission mounted integrally with engine; hydraulic brakes.

Lancia Chassis. A Chassis Worth Studying. Autocar, vol. 59, no. 1672, Nov. 18, 1927, pp. 1074–1076, 5 figs. Chassis includes many items usually considered as coachwork wings, running boards, floor boards, scuttle dash, instrument board fitted up, seat framings, back boot, and luggage compartment with lid and spare wheel carrier, tool and battery boxes, all lamps and electrical equipment completely wired up.

Marmon. Larger, Higher, Compression Engine in Marmon, M. W. Baker. Automotive Industries, vol. 57, no. 24, Dec. 10, 1927, pp. 862–864, 5 figs. Eight-cylinder model in six body styles; larger radiator and widened tread; duplex down-draft intake manifold; double roller chain driving camshaft; fan, generator, and water pump driven by belt off crankshaft; full-pressure lubrication; transmission ratios.

Sensaud de Lavaud. A New Conception of Automobile Vehicles—the Sensaud de Lavaud Motor Car (Une nouvelle conception de la voiture automobile—la voiture Sensaud de Lavaud), E. H. Weiss. Nature (Paris), no. 2772, Nov. 1, 1927, pp. 394–401, 15 figs. Description of recently exhibited car, pointing out revolutionary character of some of its features.

AUTOMOBILES

Shimmying. The Cause of Wheel Wobble, T. Petrie. Engineer, vol. 144, no. 3753, Dec. 16, 1927, pp. 676–677. Facts which emerge from investigation are: (1) wobble starts when revolutions of wheel correspond with natural criss-cross periodicity of slung portion of car; (2) period of wobble is just twice as fast as natural criss-cross movement of this superstructure; (3) sharp side blow on front wheel is necessary to start wobble; principles of vehicle suspension.

Spring Suspension. Coil Spring Suspension. Autocar, vol. 59, no. 1674, Dec. 2, 1927, pp. 1157–1158, 3 figs. Development of Garson system to its latest form to give independent springing to all four wheels.

Springs. Testing the New Springing. Autocar, vol. 59, no. 1672, Nov. 18, 1927, pp. 1093–1094, 5 figs. Trial of the Harris Leon Laisne over bad roads proves benefits of each wheel rising and falling independently as road conditions dictate.

Transmissions. The Spontan Transmission Gear. Engineering, vol. 37, no. 3227, Nov. 18, 1927, pp. 658–661, 19 figs. New Spontan transmission, designed by F. Ljungstrom of Aktiebolaget Spontan, Stockholm, in which every operation necessary for control of a car, other than that of steering, is performed by movement of a single pedal; most important feature of design is automatic gear.

AUTOMOTIVE FUELS

Aircraft Engines. Fuel for the Wright "Whirlwind." Aviation, vol. 23, no. 20, Nov. 14, 1927, pp. 1170–1172. Of the hundreds of new fuels recently put on market only two have been recognized as being satisfactory by Army and Navy Air Services; these are gasoline blended with benzol or with tetraethyl lead and even these fuels must be used with caution, as it is not sufficient to insure suitable anti-knock value unless other requirements as to purity and volatility are complied with.

Anti-Knock. Anti-Detonators, G. B. Maxwell. Instn. Petroleum Technologists—Jl., vol. 13, no. 63, Aug. 1927, pp. 578–581. Summary of prevalent theories of pinking in internal-combustion engine.

Characteristics of Some Anti-Knock Fuels in Internal Combustion Engines, M. K. Thornton, Jr., and R. Flagg. Agric. & Mech. College of Texas—Bul., vol. 13, no. 7, July 1927, 26 pp., 89 figs. There are several preparations on market which when added to gasoline are claimed to improve its qualities; among improvements claimed are that they will eliminate carbon deposit, increase power of engine, improve economy, and either reduce or eliminate detonation; investigation undertaken to determine to what extent preparations exhibit characteristics claimed for them, especially when used in engine of Ford or similar type.

Detonation. Dopes and Detonation, H. L. Callendar. Aeronautical Research Committee—Reports and Memoranda, no. 1062, Dec. 1926, 31 pp., 7 figs. Primary object of investigation was to complete rational explanation of cause of detonation in engines using liquid fuel, with especial reference to chemical side of problem; study of low-temperature oxidation of liquid fuels in air, in conjunction with engine experiments to determine relationship between detonation and observed chemical action; it is found that detonation is due to formation of organic peroxides, which become concentrated in nuclear drops during compression and ignite them simultaneously when detonation temperature of peroxide is reached; it is suggested that isolation of organic peroxides and study of their properties might lead to discovery of more useful dopes than are known at present.

AVIATION

Avigation. Oversea Navigation, A. F. Hegenberger. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 699–702, 4 figs. Avigation equipment and methods vary with each individual flight; avigation of a flight should start well before take-off; dead-reckoning and radio and astronomic avigation are all desirable.

Commercial. Air Transport in Rapid Spread. Ry. Age, vol. 83, no. 23, Dec. 3, 1927, pp. 1115–1119, 4 figs. United States now served by 7500 miles of air-mail routes; express and passengers carried on some lines; operations of air-transport companies must closely parallel those of railways and constitute branch of aviation which will have greatest development in future.

AXLES

Fatigue Cracks in. A Study of Fatigue Cracks in Axles, H. F. Moore. Forging—Stamping—Heat Treating, vol. 13, no. 11, Nov. 1927, pp. 447–449. Axles which had been in service were subjected to special test devised to indicate presence of cracks before rupture was complete; method of testing. Abstracts from Bul. No. 165, Eng. Experiment Station, Univ. of Ill.

B

BALANCING MACHINES

Centrifugal. New Olsen Balancer Operates on Electric Contact Principle. Automotive Industries, vol. 57, no. 25, Dec. 17, 1927, pp. 912–913, 1 fig. Direction of unbalanced movement indicated by spark from rotating electrode, and its amount measured by producing equal, measurable counter movement; operation simple; two transfer instruments.

Olsen-Lundgren Centrifugal Dynamic Balancing Machine. Am. Mach., vol. 67, no. 25, Dec. 22, 1927, p. 994, 1 fig. Two stands for holding work and measuring effect of centrifugal force caused by unbalance; angle of plane of unbalance shown with accuracy; for determining amount in ounce-inches, screw and weight provided on each stand, together with handwheel and graduated dial for adjustment.

BEARING METALS

Casting. Effect of Casting Temperature on Properties of Bearing Metals (Der Einfluss der Giesstemperatur auf die Laufeigenschaften von Lagermetall), H. Graefe. Maschinenbau, vol. 6, no. 20, Oct. 20, 1927, pp. 1001–1005, 23 figs. Experimental study done at testing laboratory of Siemens-Schuckert-Werke A.G., showing that wearing quality of white-metal bearings depends on grain size of metal.

BEARINGS

Anti-Friction. Machine Tool Precision Improved by Anti-Friction Bearings, R. F. Runge. Automotive Industries, vol. 57, no. 21, Nov. 19, 1927, pp. 762–763, 5 figs. Their use reduces wear and thus makes for greater accuracy and efficiency in production; many new applications have been found in last few years.

BEARINGS, BALL

Standard Specifications. Ball Bearings and Parallel-Roller Bearings. Brit. Eng. Standards Assn., no. 292, Sept. 1927, 53 pp., 36 figs. Tables of permissible errors due to eccentricity and wobble; tables of tolerances; dimension nomenclature for component parts of ball bearings and parallel-roller bearings; explanation of formation of code of reference symbols.

BELTS

Rubber-Covered. New Conveyor Belt. Chem. & Met. Eng., vol. 34, no. 12, Dec. 1927, p. 767. B. F. Goodrich Rubber Co. have adopted new construction for all their brands of rubber-covered conveyor and elevator belts; new belt is called "Highflex" and consists essentially in elimination of all folds in laying up fabric, each ply being separate unit completely insulated from adjoining plies.

BLAST FURNACES

Excess-Gas Generation. The Use of the Blast Furnace as a Gas Producer, R. Franchot. Fuels & Furnaces, vol. 5, no. 11, Nov. 1927, pp. 1451–1454. Discusses generation of excess gas in blast furnace; its use; provision for, and effect of, excess gas outlet on blast-furnace operation.

BLOWERS

Rotary. Characteristics and Operating Requirements of Positive Pressure Rotary Blowers, G. Fox. Fuels & Furnaces, vol. 5, no. 11, Nov. 1927, pp. 1481–1484 and 1501. Various types of rotary blowers; their charactertistics; power required, and motor drive.

BOILER FEEDWATER

Salinity Determination. Salinity or Impurity Determination of Boiler Feed Water, C. Huey. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 4, Nov. 1927, pp. 658–692. Water from condensation of evaporated seawater is character of boiler feedwater to be experienced in all Naval ships; on this basis author analyzes character of feedwater, and describes various methods of quantitatively measuring impurities; also closely related electrical methods for determining concentration of seawater in evaporator or distilling systems.

Silicates, Removal of. Removal of Silicate Compounds from Feedwater (Ueber die Entkieselung von kieselsäurehaltigen Wässern), E. Berl and H. Staudinger. V.D.I. Zeit., vol. 71, no. 47, Nov. 19, 1927, pp. 1654–1657, 3 figs. Methods of precipitating silicates with calcium hydroxide, modifications of process in presence of chlorides or gypsum in small or large quantities.

Treatment. Water and Its Importance in Modern Steam Power Stations. Brown Boveri Rev., vol. 14, no. 11, Nov. 1927, pp. 291–301, 8 figs. New points of view relating to action of feedwater on material used in constructing boiler and suitable treatment of water; research work carried out in Brown Boveri laboratories.

BOILER FURNACES

Refuse Conveyor and Feeder. Hofft Combined Refuse Conveyor and Feeder for Boiler Furnaces. Power, vol. 66, no. 23, Dec. 6, 1927, p. 900, 3 figs. Unit consists essentially of duplicate screw conveyors for conveying material from bin to feeders, rotary feeders for discharging refuse continuously and uniformly into furnace and necessary driving gear.

Walls, Mean Temperature of. A Note on the Calculation of Mean Temperatures in Flat Furnace Walls, S. R. Hind and R. S. Troop. Ceramic Soc.—Trans., vol. 26, part 3, 1927, pp. 249–253, 2 figs. Work is restricted to consideration of simple flat firebrick walls whose extent is large in proportion to their thickness. Closest approach to these is found in various types of gas retorts, blast furnaces and tunnel ovens which are continuously operated.

BOILER OPERATION

Control. Automatic Control Regulates Seventy-Two Boilers as a Single Unit, J. A. Ingalls. Power, vol. 66, no. 21, Nov. 22, 1927, pp. 770–774, 9 figs. 72 boilers in double-deck installation are divided into four groups, each under control of master regulator, and four group masters are controlled by station supermaster regulator.

BOILER PLANTS

Automobile Plants. Modern Steam Production in an Industrial Plant, R. J. Gaudy. Combustion, vol. 17, no. 6, Dec. 1927, pp. 379–381. For new boiler installation of Packard Motor Car Co., intermediate pressure, as measured by present practice, was established at 325 lb.; requirements for total capacity in plant dictated immediate installation of three 1200-hp. boilers; boilers are of 4-drum water-tube type, built by D. Connelly Co.

Design. Rational Boiler Plant Design for Low Cost Steam, F. A. Combe. Power, vol. 66, no. 23, Dec. 6, 1927, pp. 875–878, 3 figs. Discusses question as to whether saving in fuel consumption which is shown by recent remodeling of boiler plants represents real gain as regards net cost of steam delivered from boiler house, including all fixed, operating and incidental charges, over result that might have been effected from a less costly and possibly a less efficient arrangement.

Maintenance Costs. Maintenance Costs of 54,000-Kw. Boiler Plant. Elec. World, vol. 90, no. 24, Dec. 10, 1927, pp. 1197–1198, 1 fig. From data sheets of New England central station, costs are given for 32 months ended Aug. 31, 1927.

Pulverized-Coal. Pulverised Fuel Plant at Pooley Hall Colliery, C. H. S. Tupholme. Colliery Guardian, vol. 135, no. 3488, Nov. 4, 1927, pp. 917–919. Four No. 10 atritors have been fitted to boilers at Pooley Hall colliery, and further boiler is to be equipped with No. 16 atritor; combustion chambers are air cooled, heated air passing direct to pulverizers, where it is used for drying coal during pulverizing process.

BOILER PLATE

Crack Formation. Causes and Indications of Crack Formation in Boiler Blates (Ursachen und Merkmale der Rissbildung in Kesselblechen). Archiv für Wärmewirtschaft, vol. 8, no. 11, Nov. 1927, pp. 330–332. General review, supplementing previously published paper, discussing brittleness, fractures, cracks, influence of brine solutions, etc.

BOILERS

Fusion Welding. Fusion Welding on Boilers and Pressure Vessels, S. W. Miller. Boiler Maker, vol. 22, no. 11, Nov. 1927, pp. 319–321. Tests developed to insure good welds; suggestions for inspectors to follow in acquiring knowledge of welding processes.

High-Pressure. The Strength of Extra High Pressure Steam Drums. Power Engr., vol. 22, no. 261, Dec. 1927, pp. 461–463, 4 figs. Deals with strength of steam drum which has dimensions equal to those of boiler at Weymouth station, Mass. (Edison Illuminating Co.), working at 1200 lb. per sq. in.; drum length, 34 ft.; internal diameter, 4 ft.; and thickness, $4^1/_8$ in.

Return-Tubular. Film Evaporation Applied to Return-Tubular Boiler Increases Capacity 75 Per Cent. Power, vol. 66, no. 21, Nov. 22, 1927, p. 781, 2 figs. It has been demonstrated that film evaporation is equally effective in horizontal and vertical tubes, and that this method of steam generation makes possible high rates of evaporation under severe primary heat without damage to heating surface; tests have also demonstrated practicability of high capacity in small space and possibility of materially increasing power from existing steam boilers of fire-tube type.

Steam Purifiers. Steam Purifiers Solved the Problem, J. P. Freund. Indus. Power, vol. 8, no. 6, Dec. 1927, pp. 58–61, 2 figs. On account of long steam-distribution lines a large amount of condensation was encountered; problem was met by installation of steam purifiers in steam drums of boilers.

BORING MACHINES

Combined Drilling, Milling and. Niles Horizontal Boring, Drilling and Milling Machines. Machy. (N. Y.), vol. 34, no. 4, Dec. 1927, p. 317. New features include totally enclosed saddle and drive box, both of which are provided with automatic lubricating system to all important gears, shafts, and bearings; steel drive and feed gears, throughout; screw feed to spindle; power rapid traverse to spindle by separate motor; more convenient and centralized grouping of controls; and graduated scales on column face and bed ways to facilitate measuring vertical travel of saddle and horizontal travel of column. See also Am. Mach., vol. 67, no. 22, Dec. 1, 1927, pp. 880–881, 3 figs.

BRASS

Annealing. Critical Temperatures in the Annealing of Brass Wire (Kritische Temperaturen beim Glühen von Messingdraht), F. Ostermann. Zeit. für Metallkunde, vol. 19, no. 9, Sept. 1927, pp. 349-351, 12 figs. Both tensile strength and ductility are considerably reduced and metal tends to become brittle; this phenomenon is especially marked after double annealing at 650 deg.; most satisfactory structure of brass containing 63 per cent Cu is obtained by annealing at 600 deg. and cooling slowly or by annealing at 700 deg. and quenching; in any case second annealing operation should be avoided.

High-Grade. High-Grade Brass (Qaulitätsmessing), J. H. Wieland. Zeit. für Metallkunde, vol. 19, no. 11, Nov. 1927, pp. 417–422. Discusses manifold specification requirements and ways of satisfying them; brass alloys, phase-rule diagrams, chemical and mechanical properties; melting, casting, rolling, pressing, drawing and heat treatment; initial strains, effect of impurities; prospects.

Ingot Melting. Some Practical Notes on the Manufacture of Brass Ingots or Strip, N. F. Fletcher. Metal Industry (Lond.), vol. 31, no. 19, Nov. 11, 1927, pp. 441–442. Describes methods whereby metals which form brass are melted and cast into ingots for subsequent rolling into strips. Paper read before Midland Section of Junior Instn. of Engrs.

Practice. The Fundamentals of Brass Foundry Practice, R. R. Clarke. Metal Industry (N. Y.), vol. 24, nos. 7, 8, 9, 10, and 11, July, Aug., Sept., Oct., and Nov. 1926, pp. 283–284, 318–320, 365–366, 417–418, and 453–454, and vol. 25, nos. 1, 2, 3, 4, 5, 8, 9, 11, and 12, Jan., Feb., Mar., Apr., May, Aug., Sept., Nov., and Dec. 1927, pp. 6, 63–64, 105–106, 146–148, 194–195, 327, 369–370, 455–456 and 493–494, 51 figs. Description of basic laws which control melting and casting of metals and their application to practical foundry operations.

C

CAMS

Special, Machining. Milling Cams of Unusual Outline, C. O. Herb. Machy. (N. Y.), vol. 34, no. 4, Dec. 1927, pp. 273–277, 11 figs. Typical methods of machining special cams ordered in small lots.

CARS

Truck Side Frames. An Analysis of Truck Side Frame Design, D. S. Barrows. Ry. Mech. Engr., vol. 101, no. 12, Dec. 1927, pp. 783–787, 13 figs. Shows how truck frames are designed on truss basis; economy of catenary construction; discussion limited to A.R.A. and Symington frames; how to obtain structure of maximum strength per pound of weight and also increased spring capacity.

CARS, COAL

Large-Capacity. Large Freight Cars (Grossgüterwagen), W. Jacobsohn. Verkehrstechnik, vol. 40, no. 45, Nov. 11, 1927, pp. 785–789, 8 figs. Characteristics of large American and German cars, for coal and similar freight, of capacities from 50 to 100 tons, provided with hoppers or other self-unloading mechanism.

CARS, FREIGHT

Dump. A Dual Side-Pivot Drop-Door Air Dump Car. Ry. Age, vol. 83, no. 24, Dec. 10, 1927, p. 1161, 1 fig. Designed to meet special problems in pit mining or similar operations and maintenance-of-way work.

CARS, REFRIGERATOR

Palestine Railways. New Perishable and Refrigerator Cars, Palestine Railways. Ry. Engr., vol. 48, no. 575, Dec. 1927, pp. 451–455. These vehicles incorporate special features of design, particularly in respect of method of insulation; ice tanks carrying 2 tons of ice are fitted in roof; doors perfectly air and watertight.

CASE-HARDENING

Gas Carburization. Gas Carburization of Steel, R. G. Guthrie and O. Wozasek. Am. Soc. Steel Treating—Trans., vol. 12, no. 6, Dec. 1927, pp. 853–868 and (discussion) 868–870, 10 figs. Deals with use of so-called city or manufactured gas for carburizing medium and considers certain inconsistencies heretofore encountered in its use: (1) variation in depth and concentration of case from day to day; (2) what constituent in gas is responsible for carburization of steel; (3) mechanism of carburization; (4) factors affecting this mechanism; results show advantages to be gained from treatment of carburizing gas at furnace, and catalyzing steel in furnace at beginning of run.

Nitration Hardening. Surface Hardening by Nitrogen. Foundry Trade Jl., vol. 37, no. 588, Nov. 24, 1927, pp. 135–136. New process of Dr. Fry, of Research Laboratories of F. Krupp of Essen, consists of subjecting parts to be hardened to action of ammonia gas at temperature of 500 deg. cent. for period of time varying from 40 to 120 hr.; ammonia is dissociated, and portion of nitrogen thus formed passes into solid solution in outer layers of parts; one of most valuable features of process is small amount of distortion which parts undergo during nitrogen treatment; electric furnaces essential.

Soft Steel. Case-Hardening of Soft Steel, G. A. Nelson. West. Machy. World, vol. 18, no. 11, Nov. 1927, pp. 532–533, 7 figs. Operations in heat-treatment department of Pacific Gear & Tool Works; results obtained with soft steel heat treated in electric furnace.

CAST IRON

Automotive Industry. Gray Cast Iron in the Construction of Automobiles and Aircraft (Grauguss im Automobil- und Flugzeugbau), G. Meyersberg. Giesserei, vol. 14, no. 43, Oct. 22, 1927, pp. 747–750. Discusses improvements in cast iron and properties which make its use in automobile and aircraft manufacture advisable.

High-Strength. Makes High Test Cast Iron, M. E. Greenhow. Foundry, vol. 55, no. 23, Dec. 1, 1927, pp. 919–920. Castings with varying sections require close-grained, high-strength, wear-resisting iron which is obtained by nickel additions; gives results and data on method followed.

Industrial Uses. Cast Iron as Engineering Material (Gusseisen als Werkstoff), T. Geilenkirchen. Giesserei, vol. 14, no. 43, Oct. 22, 1927, pp. 721-724. Discusses development and importance of cast iron as engineering material for trade products and as basic material for iron working industry.

Pearlitic. Pearlitic Cast Iron for Heat Engines and Their Appurtenances (Perlitguss für wärmetechnische Zwecke), G. Meyersberg. Archiv. für Wärmewirtshcaft, vol. 8, no. 11, Nov. 1927, pp. 340–341, 6 figs. Shows that mechanical properties of pearlitic iron, particularly its resistance to high temperatures, make it most suitable as construction material for thermotechnical purposes, such as high-pressure plants, internal-combustion engines, etc.

Phosphorus, Influence of. The Resistance to Wear of Cast Iron Containing Phosphorus (Ueber den Verschleisswiderstand des phosphorhaltigen Graugusses), E. Piwowarsky. Giesserei, vol. 14, no. 43, Oct. 22, 1927, pp. 743–747, 4 figs. Results of tests show that wear resistance increases with increasing phosphorus content; tests were carried out with two different testing devices, namely, Amsler and Spindel machines.

CASTINGS

Design. Foundry Practice and the Design of Castings, T. Makomson. Foundry Trade Jl., vol. 37, no. 586, Nov. 10, 1927, p. 110, 2 figs. Author cites directions in which design increased difficulty of foundryman; closest coöperation should exist between foundry and pattern shop, and representative of foundry should give lead with regard to general method that it was intended to follow when molding any given job.

CENTRAL STATIONS

High-Pressure. Operating Experiences with 1300 Lb. Steam Pressure, J. Anderson. Engineer, vol. 144, no. 3750, Nov. 25, 1927, pp. 605-607, 2 figs. Lakeside station operation; desirability of 1300-lb. pressure; tells of major troubles experienced.

Natural-Gas-Fired. Amarillo Station Uses Natural Gas As Fuel. Power Plant Eng., vol. 31, no. 22, Nov. 15, 1927, pp. 1176–1180, 6 figs. Station of Southwestern Public Service Co. in Texas Panhandle uses modern control equipment, spray pond cooling and special ground.

New York City. Analysis of System Conditions, J. W. Lieb. Elec. World, vol. 90, no. 24, Dec. 10, 1927, pp. 1187–1191, 13 figs. Study of load durations, other utility load characteristics,

seasonal and weather effects, output, demand, load and coal-consumption trends, load densities and system layout.

CHROMIUM STEEL

High Temperatures. Steel for High Heats and Loads. Iron Age, vol. 120, no. 24, Dec. 15, 1927, pp. 1662–1663, 3 figs. Chromium steel and chrome-nickel steels have best combination of properties; huge seamless drums now forged for petroleum stills, chemical cells and boilers; advanced construction of values. Address before N. Y. Chapter, Am. Soc. for Steel Treating.

CLUTCHES

Machining. Machining Friction Clutch Parts, R. Mawson. Can. Machy., vol. 38, no. 18, Nov. 3, 1927, pp. 17–18, 6 figs. Methods employed by clutch manufacturer in machining various components of particular type of friction clutch, on production basis without recourse to expensive jigs and fixtures.

COAL

Carbonization. The K.S.G. Process of Low-Temperature Carbonization, W. Runge. Am. Soc. Mech. Engrs.—advance paper for mtg., Dec. 5–8, 1927, 7 pp., 2 figs. Principle of operation, and field of application of process; schedule of heat and power requirements shows that 1,630,000 B.t.u. is necessary to carbonize a ton of coal; quality of coke and tar; amount, analysis, and heating value of gas evolved; economic phases of process; market for by-products; expected revenue per ton; coal data of Essen plant transposed to American conditions for capacity of 600 tons of coal per day, and projected commercial development.

Pulverized. See PULVERIZED COAL.

COAL HANDLING

Pneumatic. Pneumatic Coal Handling (Pneumatische Kohlenförderung). Fördertechnik u. Frachtverkehr, vol. 20, no. 23, Nov. 11, 1927, pp. 404–407, 11 figs. Principles of German equipment and examples of European, mostly German, plants.

The Neuvako Pneumatic Conveying System. Engineering, vol. 124, no. 3230, Dec. 9, 1927, pp. 741–744, 11 figs. Installation is extension by Ashwell and Nesbit, Ltd., of coal-conveying plant previously erected by them at important riverside factory in East London; plant is of suction type.

COMBUSTION

Control. Combustion Control Formulas, E. A. Uehling. Power, vol. 66, nos. 23, 25 and 26, Dec. 6, 20 and 27, 1927, pp. 880–881, 970–972 and 1010–1012. Author derives number of combustion formulas based on new equicalorific fuel unit and shows how these formulas can be used for combustion-control purposes. Dec. 20: Pound carbon fuel unit. Dec. 27: Development of heat-loss equations.

CONVEYORS

Belt. Handling Bulk Materials with Belt Conveyors, H. F. Geist. Chem. & Met. Eng., vol. 34, nos. 11 and 12, Nov. and Dec. 1927, pp. 664–667 and 744–748, 8 figs. Presents tables which enable engineer or initiated layman to select width and ply of belt required, effective pull required for haul, speed, horsepower, maximum permissible haul, and size of drive pulley and its shaft for either plain grease-bearing type or anti-friction-bearing type belt carriers. Dec.: Practical design; tables which permit of ready solution to any conveyor problem.

Link-Belt Anti-Friction Belt Conveyor Idler. West. Machy. World, vol. 18, no. 11, Nov. 1927, pp. 557–558, 1 fig. Bearings of Timken tapered roller-bearing type totally encased within roll hub; absolute protection afforded by labyrinth grease seal; interchangeable rolls; charactertistic of roll-shell material varied to suit needs.

Control. How a Complex Conveyor System Was Magnetically Controlled, P. T. Van Bibber. Indus. Eng., vol. 85, no. 11, Nov. 1927, pp. 507–508, 2 figs. Sets forth unusual method of making magnetic type of switch serve also as sort of automatic block-control system on conveyor installation.

Drives and Gearing. Conveyor Drives and Gearing, E. C. Hatcher. Chem. & Industry, vol. 46, no. 46, Nov. 18, 1927, pp. 1063–1064, 2 figs. Deals with belt, chain, open-gear and totally enclosed gear drive; open spur-gear drive is probably most generally used form of conveyor drive; H-R gear manufactured by J. Stone & Co., combines advantages of all types, being standard form of gear box in which any speed ratio from 6 to 1 to 100,000 to 1 can be provided; because of its special construction, only smallest number of teeth are necessary on final driving wheel.

Floor-to-Floor. Floor to Floor Conveyors, E. J. Tournier. Indus. Eng., vol. 85, no. 11, Nov. 1927, pp. 517–519, 5 figs. Describes handling of breakfast cereals, bales, large boxes, small boxes, bags and cartons.

Overhead. What Industrial Uses of Overhead Conveying Machinery, E. T. Bennington. Factory, vol. 39, no. 5, Nov. 1927, pp. 800–802. Analysis of types and applications.

Portable. Portable Loaders, L. I. Thomas. Indus. Power (Indus. Handling), vol. 13, no. 5, Nov. 1927, pp. 137–142. This type of equipment will load from 20 to 60 tons an hour; consists of section of belt or bucket conveyor supported at incline on wheels or on crawler type of mounting.

COPPER ALLOYS

Adnic. Physical Properties of Adnic, W. B. Price. Min. & Met., vol. 8, no. 251, Nov. 1927, pp. 474–475, 2 figs. New corrosion and heat-resisting white-metal alloy, having composition of copper, 70 per cent; nickel, 29 per cent; tin, 1 per cent.

Brass. See BRASS.

Phosphor-Copper. Phosphor-Copper. Foundry Trade Jl., vol. 37, no. 585, Nov. 3, 1927, p. 86. Claim is made that by method described, no loss of phosphorus is sustained and that uniform phosphor-copper is produced with introduction of 15 per cent phosphorus.

CRANES

Cargo. Modern Cargo Cranes, B. Dunell. Pac. Mar. Rev., vol. 24, no. 11, Nov. 1927, pp. 512–513 and 30, 8 figs. Types available, factors governing selection, and latest developments.

Floating. A 400-Ton Floating Crane. Shipbldg. & Shipg. Rec., vol. 30, no. 20, Nov. 17, 1927, pp. 554 and 558, 2 figs. Crane, Romanus, has largest capacity of any similar structure in world; built for harbor work for the Syndicato Italiano Costruzioni Appalti Marittimi, Rome, by Cantieri del Tirreno, Genoa; crane pontoon has length of 197 ft., beam of 98 ft. 6 in., and depth of 14 ft. 6 in. from keel to deck.

Gantry Charging. Gantry Charging Crane. Iron Age, vol. 120, no. 24, Dec. 15, 1927, p. 1666, 2 figs. Equipment of new method of handling castings into annealing ovens has been installed by large heavy-machinery builder in Middle West, effecting, it is said, substantial reduction in handling costs; consists of single-leg gantry bridge upon which charging trolley of special design is operated.

Overhead Traveling. 10-Ton Overhead Traveling Crane. Iron & Steel Engr., vol. 4, no. 11, Nov. 1927, pp. 483–486, 6 figs. 60-ft. span electric crane, constructed entirely by means of arc welding by Cleveland Crane & Engineering Co., Wickliffe, Ohio.

CUPOLAS

Charging. The Ruscoe Cupola Charger. Foundry Trade Jl., vol. 37, no. 587, Nov. 17, 1927, p. 117. Automatic feeding machine can be attached to existing plants, and renders installation of hoist unnecessary.

Practice. Hints on Cupola Practice, A. Sutcliffe. Foundry Trade Jl., vol. 37, no. 588, Nov. 24, 1927, p. 146. Principal causes of bad melting are faulty quantity and faulty delivery of blast, associated with poor arrangement of charge in furnace; author is of opinion that where adjustments are required in quantity of iron which founder requires to be delivered to him at commencement of his casting operations, they cannot be made satisfactorily by alterations of blast or of weight and disposition of charges in one cupola except within inconsiderable limits; ascertaining blast requirements; numerous large tuyeres advocated.

CUTTING METALS

Cutting Temperatures. Cutting Temperatures, E. G. Herbert. Engineering, vol. 124, no. 3230, Dec. 9, 1927, pp. 759–762, 13 figs. Investigation of heat-resisting properties of high-speed steel, after being subjected to various primary and secondary hardening temperatures; effect of cutting temperatures on work materials. Read before Instn. Mech. Engrs.

D

DIESEL ENGINES

Air Cleaners. New Development in Air Intake Protection. Oil Engine Power, vol. 5, no. 11, Nov. 1927, p. 762, 2 figs. Well-known type of centrifugal air cleaner adapted to Diesel requirements.

Airless-Injection. A New Two-Stroke Oil Engine, F. Sass. Brit. Motorship, vol. 8, no. 93, Dec. 1927, pp. 346–348, 15 figs. Test results on single-cylinder 1000-b.hp. experimental engine of Hesselman A.E.G.; solid-injection double-acting type.

Benz. Benz Diesel Engine Uses Solid Injection. Power Plant Eng., vol. 31, no. 22, Nov. 15, 1927, pp. 1192–1193, 3 figs. Precombustion chamber, turbulence produced by mixing nozzle, and individual injection pumps are features of Chicago Pneumatic Co.'s Benz engine.

Bessemer. New Bessemer Diesels of Unique Design. Mar. Eng. & Shipg. Age, vol. 32, no. 11, Nov. 1927, pp. 635–636, 3 figs. R-line straight eights and sixes built for marine service follow automotive practice; details of construction.

Cylinder Wear. The Probable Causes of Cylinder Wear in Marine Oil Engines. Mar. Engr. & Motorship Bldr., vol. 50, no. 603, Nov. 1927, pp. 412–414, 1 fig. Considers possible principal causes of cylinder wear in Diesel engines and remedies.

Heat Transmission. Transmission and Removal of Heat by the Cooling System of Diesel Engines, W. Wakefield. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 3, Aug. 1927, pp. 514–532, 5 figs. Transfer of heat from time of combustion until it reaches cooling medium is biggest problem that confronts designer of large Diesel engines; question has two phases: (1) transfer of heat of combustion to metal walls of combustion chamber; (2) transfer of heat through combustion chamber walls to cooling medium.

Lubrication. Cylinder Lubrication of Diesel Engines, C. G. A. Rosen. Pac. Mar. Rev., vol. 24, no. 12, Dec. 1927, pp. 568–569 and 41, 3 figs. Kinds of oil used, methods of application and distribution and combustion processes.

M.A.N. The New Hamilton-M.A.N., Two Cycle, Double Acting Marine Engine, H. Greger. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 3, Aug. 1927, pp. 544–559, 8 figs. Details of construction of first Hamilton M.A.N. Diesel engine built in United States for Shipping Board; four-cycle 3300 hp. type; cylinders $27\frac{1}{2} \times 47\frac{1}{4}$, 95 r.p.m.; installed in Seminole.

The World's Greatest Diesel Marine-Engine Installation (Die grösste Schiffs-Dieselmotorenanlage der Welt). Schiffbau, vol. 28, no. 14, July 20, 1927, pp. 318–321, 4 figs. Report of tests of first 9000-hp. unit of power plant of SS. Augustus; details of Diesel engines of the M.A.N. Savoia type built by Ausaldo of Genoa.

Oil-Well Drilling. Cutting Oil Well Drilling Costs. Oil Engine Power, vol. 5, no. 12, Dec. 1927, pp. 831–833, 5 figs. Diesel engine was developed by Bessemer Gas Engine Co. specifically for this purpose; remarkably low cost of only $32.50 was obtained on well drilled at Saginaw, Mich., as compared with average of $450 for coal with boiler repairs caused by available water at many locations in this field.

DROP FORGING

Die Rolling vs. Drop-Forging and Die-Rolling. Iron & Steel World, vol. 1, no. 2, Mar. 1927, pp. 145–146, 3 figs. Discussion of various factors which determine whether particular shape can best be made by drop forging or die-rolling.

Fin Formation. Influence of Fin Formation on the Internal Structure of Drop Forgings, E. Decherf. Iron & Steel World, vol. 1, no. 7, Aug. 1927, pp. 489–492, 8 figs. Factors influencing position and formation of fins in drop forging; value of macroscopic tests in determining flow and internal tension of metal. Translated from Revue Universelle des Mines.

DYNAMICS

Newton's Law of Motion. A Suggested Method of Presenting Newton's Second Law of Motion, N. P. Bailey. Jl. Eng. Education, vol. 18, no. 3, Nov. 1927, pp. 176–177. Failure to grasp completely Newton's Second Law of Motion is one of worst stumbling blocks of average undergraduate student in dynamics; past observation has convinced writer that this trouble is primarily caused by introduction of thoroughly intangible quantity, mass, as fundamental unit in statement of familiar law, $F = Ma$.

E

ELECTRIC FURNACES

Melting. Electric Melting Furnaces Used in Making Steel for Bearings. Fuels & Furnaces, vol. 5, no. 11, Nov. 1927, pp. 1459–1462, 3 figs. Unique design of electric-arc melting furnaces proves very efficient in production of steel for bearings.

ELECTRIC LOCOMOTIVES

Storage-Battery. Performance of 120-Ton Storage Battery Locomotive, E. Taylor. Ry. & Locomotive Eng., vol. 40, no. 11, Nov. 1927, pp. 319–324, 1 fig. Summary of operation in three terminal freight yards in Chicago; advantages; tractive effort, 71,000 lb., maximum speed, 30 m.p.h.

ELECTRIC WELDING, ARC

Arc Length. Correct Arc Length, J. B. Green. Welding Engr., vol. 12, no. 10, Oct. 1927, pp. 37–38, 2 figs. Study of metal transfer furnishes basis for determining proper length and practical means for maintaining it. See also Can. Machy., vol. 38, no. 20, Nov. 17, 1927, pp. 21–22.

Buildings. Arc Welded Building in Berkeley, Calif. Welding Engr., vol. 12, no. 10, Oct. 1927, p. 45, 2 figs. Shop is 50 by 250 feet, carrying two 10-ton capacity cranes; structure is entirely welded, no bolts or rivets being employed.

Developments. Electric Welding. Am. Inst. Elec. Engrs.—Jl., vol. 46, no. 12, Dec. 1927, pp. 1431–1435. Locomotive-boiler repairs; shipbuilding; welding structural steel for buildings; pipe lines; welding to replace castings; resistance welding. Report of Committee on Electric Welding.

Oil-Cracking Vessels. Welding Oil Pressure Cracking Vessel, R. Stresau. Nat. Petroleum News, vol. 19, no. 47, Nov. 23, 1927, pp. 64–71, 18 figs. Type of design required for stills operating at 900 deg. fahr. and pressures of 1000 lb. per sq. in. or more must also be such that material used in every part of vessel is equally stressed; process developed by A. O. Smith Corp. in manufacturing pressure stills.

Rails. Building Up Battered Rail Joints by Electric Arc Welding. Ry. Eng. & Maintenance, vol. 23, no. 12, Dec. 1927, pp. 522–524. Electric method has been confined to western states; outfits placed in regular service in 1924, first on Western Pacific and later on other western roads, consists of gas engine and generator mounted on track car, with necessary conductor cables and grinders; welding unit consists of 40-hp. 4-cylinder gas engine direct-connected through clutch to 250-ampere welding generator.

Tank Seams. Arc Welding Tank Seams at High Speeds, R. E. Kinkead. Boiler Maker, vol. 22, no. 11, Nov. 1927, pp. 307–308. Physical tests by E. V. Kesinger of Empire Companies of Bartlesville, Okla.; both average and maximum strength of welds was increased in going from 120–160 amperes to 200 amperes.

ENGRAVING MACHINES

Sixtus. "Sixtus" Engraving Machine. Am. Mach., vol. 67, no. 24, Dec. 15, 1927, pp. 956–957, 2 figs. Work and master guiding tables on same level; special design cutter with grinding fixture and wheel; means for adjusting pantograph; adaptable for making master types and other engraving operations.

F

FACTORIES

Driveways. Factory Streets and Lower Handling Costs, L. K. Urquhart. Factory, vol. 39, no. 5, Nov. 1927, pp. 827–834. Ideal driveway surface is one that is most nearly permanent so that heaviest and most destructive traffic will have little or no effect upon it; it also presents least resistance to load movements, is not slippery in wet weather, is dustless, drains quickly, is not excessive in first cost, and does not require frequent and expensive maintenance.

FANS

Characteristics. Tests to Determine the Effects of Throttling the Inlet on the Characteristics for a Fan, H. Mawson. Instn. Civil Engrs.—Eng. Paper, no. 51, 1927, 16 pp., 9 figs. Object was to ascertain effects of altering suction pressure at eye of fan by throttling inlet; experiments were made on "Sirocco" ventilating fan.

FITS

Standards. Comparison of American, British and German Standards for Metal Fits, I. H. Fullmer. U. S. Bur. Standards—Technologic papers, no. 344, June 7, 1927, pp. 401–407. Quantitative comparison is made; American standard is simplification of practice, by selection of practice which meets majority of requirements of interchangeable quantity production; it is therefore much simpler than European systems designed to cover all types of machine construction; each of three national systems is briefly described; fits of American system are compared with fits of European systems having basic hole and unilateral tolerances; comparisons are made by means of two diagrams. Bibliography.

FLUE-GAS ANALYSIS

Testers. Investigations of Siemens Flue-Gas Tester (Untersuchungen am Siemens-Rauchgasprüfer), W. Pflaum. Archiv für Wärmewirtschaft, vol. 8, no. 10, Oct. 1927, pp. 304–308, 13 figs. Tests, at Danzig Institute of Technology, on degree of precision and lagging of indicator, costs and attendance required, established adequacy of instrument for practical purposes.

FLYING BOATS

Dornier "Superwal." The New Dornier "Superwal" (Ein neuer Dornier-Superwal), L. Merz. Luftfahrt, vol. 31, no. 21, Nov. 7, 1927, pp. 325–326, 2 figs. Features of flying boat 24.6 m. long, equipped with four motors (Gnome and Rhone-Jupiter) of 1800 hp. total power.

Take-Off. An Investigation into the "Take-Off" of Flying Boats, A. Gouge. Flight, vol. 19, no. 47, Nov. 24, 1927, pp. 810a–810d, 4 figs. Determines relative importance of various factors which enter into any calculations made on take-off; main factors are: horsepower available or rather effective thrust; water resistance of hull; air resistance; wing area.

FORGING

Die Design. Forging Machine Die Design for Deep Piercing, E. R. Frost. Am. Soc. Steel Treating—Trans., vol. 12, no. 6, Dec. 1927, pp. 954–967, 43 figs. Method and die design for producing upset machine forgings having deep holes pierced through them, procedure to be followed in design of dies and piercers, as well as pitfalls to be avoided; kind of material that can be forged; working temperatures, and kind of steel and treatment for piercer tools.

Improved Die Design Increases Production, R. Henry. Iron & Steel World, vol. 1, no. 9, Oct. 1927, pp. 637–638. Savings in labor and material result from application of gang forging methods to manufacture of forgings of varying cross-section.

Safety Code. Safety Code for Forging and Hot Metal Stamping. U. S. Bur. Labor Statistics—Bul., no. 451, Aug. 1927, 32 pp., 31 figs. Code applies to all classes of power-forging machinery for both drop forging and flat-die forging, including steam hammers, pneumatic hammers, mechanically operated hammers, hydraulic presses, trimming presses, bulldozers, upsetting machines, and bolt-heading and rivet-making machines, hot saws; and incidental operations in connection with such machinery.

FORGINGS

Heating and Handling. Furnace Aids in Modernizing Forgings, F. W. Manker. Forging—Stamping—Heat Treating, vol. 13, no. 11, Nov. 1927, pp. 431–432, 2 figs. Equipment used for heating and handling forgings at plant of Willys-Overland Co.

FOUNDRIES

Automobile Plants. Buick Foundry Gives Men Better Working Conditions, A. F. Denham. Automotive Industries, vol. 57, no. 21, Nov. 19, 1927, pp. 754–757, 8 figs. Molds are assembled on moving conveyors, molten metal is poured into them while in motion from ladles hung from overhead cranes, after which molds enter shroud over conveyor line which takes away heat and gases generated in casting and which in a normal foundry are allowed to escape into air; mold and facing sand is fed by overhead hoppers in quantities required, keeping floors clean and eliminating dust.

Making Cores in the Dodge Foundry, J. B Nealy. Foundry, vol. 55, no. 22, Nov. 15, 1927, pp. 876–878 and 887, 7 figs. Automobile manufacturer produces large tonnage of gray-iron castings in relatively small space.

Farm-Implement Parts. Casting Parts for Agricultural Implements, E. G. Brock. Can. Foundryman, vol. 18, no. 11, Nov. 1927, pp. 7–10, 7 figs. Efficient production of plows and other farm implements is achieved at Cockshutt Plow Co.'s plant at Brantford, Ont., by a minimum of skilled labor through simplification of operations and use of modern equipment. See also Can. Machy., vol. 38, no. 22, Dec. 1, 1927, pp. 20–23, 6 figs.

Future Prospects. Gray Iron Foundry Faces a New Era, E. A. Custer, Jr. Iron Age, vol. 120, no. 21, Nov. 24, 1927, pp. 1447–1449. Author declares that new methods in preliminary stages of development will make possible "come back" commercially and scientifically. See also Iron Trade Rev., and vol. 81, no. 21, Nov. 24, 1927, pp. 1294–1295.

Mechanical Organization. The Mechanical Organization of Foundry Work, M. H. Magdelenat. Foundry Trade Jl., vol. 37, no. 585, Nov. 3, 1927, p. 88. Points out that French markets are not adapted for mass production; in industry in France men are more to be desired than machines, but as this desire is not likely to be fulfilled soon they must resolutely take up mechanical organization of foundry work, preceded by standardization.

Practice. Modern Foundry Practice (Neuzeitliche Forderungen im Giessereibetriebe), J. Mehrtens. Giesserei-Zeitung, vol. 24, no. 21, Nov. 1, 1927, pp. 597–601, 5 figs. Comparison of old and up-to-date methods; American and German practice; molds and cores, molding machines, patterns and pattern plates, etc.; cost accounting.

Radiator. Radiator Foundry Requires Exacting Sand Control, F. G. Steinbach. Foundry, vol. 55, no. 23, Dec. 1, 1927, pp. 912–918 and 931, 11 figs. Radiators, burners, regulators, and flues are manufactured complete at Newcomerstorn, O., plant of James B. Clow & Sons; special foundry in which cast parts of unit are made, contains number of interesting features including special sand-handling and preparing unit, special rigs for pouring and shaking out castings, special molding equipment, etc.

FOUNDRY EQUIPMENT

Conveyors. Piston Molding Conveyor Units. Iron Age, vol. 120, no. 23, Dec. 8, 1927, pp. 1582–1583, 3 figs. Mold conveyors, hooded cooling conveyors and sand-handling system result in much labor saving in automobile foundry of Buick Motor Co., Flint, Mich.

Mass Production with Conveyors, J. R. Nealey. Iron Age, vol. 120, no. 25, Dec. 22, 1927, pp. 1716–1718, 3 figs. Continuous operations both in casting and in core baking; industrial trains operate between departments in foundry of Dodge Brothers, Detroit, where from 1200 to 1800 sets of castings are made in a day.

Cranes. Modern Crane Equipment for a Foundry. Elec. Engr. of Australia & New Zealand, vol. 4, no. 7, Oct. 15, 1927, pp. 245–246, 3 figs. Recent installation at Yarraville, Victoria.

Sand-Handling. Foundry Output Increased by Sand-Handling Equipment, G. A. Gunther. Iron Age, vol. 120, no. 24, Dec. 15, 1927, pp. 1645–1649, 8 figs. Deals with continuous molding and sand-conditioning unit at South Bend, Ind., plant of Studebaker Corporation; equipment is combination of conveying, elevating and sand-conditioning units so arranged that none of sand entering into making of castings is handled by hand, nor is any of heavy lifting, so typical of foundry work, done by man power.

Sand-Condition Plant Saves Labor. Iron Age, vol. 120, no. 22, Dec. 1, 1927, pp. 1512–1513, 3 figs. Combination of conveyors and elevators reduces time 20 per cent; smoother castings reported.

FUELS

Coal. See COAL; PULVERIZED COAL.

Oil Fuel. See OIL FUEL.

FURNACES, ANNEALING

Charging. New Type of Charger for Sheet-Metal Annealing Furnaces (Neuartige Beschickungsvorrichtung für Blechglühöfen), C. Hoffmann. Stahl u. Eisen, vol. 47, no. 44, Nov. 3, 1927, pp. 1874–1876, 3 figs. New charging device, made by F. Krupp, Gruson Works, Magdeburg-Buckau, serves for charging stack of sheets weighing up to 3½ tons, sheets having width of 0.8 to 1.5 m. and length of 3½ m.

FURNACES, FORGING

Electric. Electrically Heated Forging Furnace, H. G. D. Nutting. Elec. World, vol. 90, no. 24, Dec. 10, 1927, pp. 1201–1202, 2 figs. Installed in Detroit automobile-parts plant to heat steel for upsetting purposes; known as Berwick metal heater and made by Am. Car & Foundry Co.

FURNACES, HEAT-TREATING

Oil-Burning. Burning Oil in Heat Treating Furnaces. Fuel Oil, vol. 6, no. 6, Dec. 1927, pp. 27–28 and 140. There is no one type of burner suitable for all heating requirements; essential features are that it be properly proportioned to oil and air, or steam pressures available, and so designed that all parts are accessible and permit of close adjustment, cleaning, and convenient removal from furnace, without affecting operation of any other burner served by same piping system.

FURNACES, INDUSTRIAL

Design. Practical Industrial Furnace Design, M. H. Mawhinney. Forging—Stamping—Heat Treating, vol. 13, no. 11, Nov. 1927, pp. 452–455, 3 figs. Furnace construction as it relates to

members which are either castings or structural steel; physical characteristics of metals.

FURNACES, MELTING

Design. A Note on Foundry Equipment with Special Reference to Furnaces, C. A. Otto. Mech World, vol. 82, no. 2133, Nov. 18, 1927, pp. 378–379. Review of developments in brass foundries ordinary; crucible furnaces are gradually being displaced by other furnaces of more up-to-date type, which are capable of dealing with much larger quantity of metal in considerably less time, taking up less space and requiring comparatively less labor to prepare metal; electric furnaces.

G

GAGES

Metals for. Recent Experiments Relating to the Wear of Plug Gages, H. J. French and H. K. Herschman. Am. Soc. Steel Treating—Trans., vol. 12, no. 6, Dec. 1927, pp. 921–945 and (discussion) 945–953. Results of tests made in laboratory wear tester in gaging file-hard high-carbon steel, an aluminum "piston alloy" and cast ion; in tests made in file-hard high-carbon steel in presence of non-metallic abrasive, stellite, high-carbon high-chromium iron alloy and chromium-plated gages showed better resistance to wear than customary high-carbon steels or Nitralloy.

GAS ENGINES

Producer-Gas. Thoughts on the Installation of Producer-Gas Engines, H. W. Los. Power, vol. 66, no. 26, Dec. 27, 1927, pp. 1019–1020. Installing engine in cramped quarters; normal gas production should be possible with shallow fire in producer; minimum loss of coal is indication that plant is in good condition and criterion of efficient gas production.

GEAR CUTTING

Hobbing. Hobbing Brass Worm-Gears. Machy (N. Y.), vol. 34, no. 4, Dec. 1927, p. 298, 2 figs. Describes fixture for hobbing worm gear on drilling machine.

Hobs. Cutting and Heat-Treating Gear Hobs, D. M. Duncan. Can. Machy., vol. 38, no. 22, Dec. 1, 1927, pp. 17–19. Discussion of problems incident to production of accurate gears and gear-cutting tools, together with description of methods of machining and heat treating employed by Ontario concern.

Indexing Segment Gear. Sine Bar Indexing Device for Segment Gear. Machy. (Lond.), vol. 31, no. 786, Nov. 3, 1927, pp. 137–138, 2 figs. Method of indexing by angular measurements devised by writer after regular indexing equipment had failed to give accuracy required in cutting segment gear and pinion for model of new machine; gears having prime numbers of teeth that cannot be readily spaced by dividing head can easily be cut by this method.

GEARS

Noise Testing of Gear Boxes. Gear-Box Noise-Testing Machine. Machy. (Lond.), vol. 31, no. 786, Nov. 3, 1927, pp. 142–145, 8 figs. Apparatus for indicating and comparing magnitude of sound; by its use all kinds of gear units can be tested as simple production operation.

Tooth-Hardness Testing. Testing the Hardness of Gear Wheel Teeth. Engineer, vol. 144, no. 3751, Dec. 2, 1927, p. 635, 3 figs. Describes appliance produced by Vickers, Ltd., as adjunct to their diamond hardness-testing machine; in new attachment mount of diamond is cut away so as to permit diamond to reach pitch line of tooth without interference from next succeeding tooth.

Variable-Speed. Novel Variable Gear. Autocar, vol. 59, no. 1674, Dec. 2, 1927, pp. 1166–1167, 6 figs. Two helical gear wheels and swashplate control mechanism, constituting multi-speed gear; operation; transverse-cam rotation; obtaining reverse; clutch optional fitting.

GRINDING

Automobile Parts. Development in Cylinder Grinding, M. C. Hutto. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 669–677, 13 figs. Manufacturing of more accurate pistons necessitated better cylinders; problem was to develop new grinding methods which would have four distinct improvements; greater accuracy, greater speed, better finish and lower cost; grinders recently developed have surpassed in performance expectations of designers.

External Grinding in Automotive Production, O. A. Knight. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 708–712, 8 figs. Describes progress being made in machines and methods for external grinding, including plain cylindrical work, crankshafts, camshafts and other irregular work, and simultaneous grinding of two surfaces; classification of grinding finishes.

GRINDING MACHINES

Cam-Grinding Attachment. Norton Automatic Indexing Cam Grinding Attachment. West. Machy. World, vol. 18, no. 11, Nov. 1927, p. 552, 2 figs. Applied to Norton type A and type BA cylindrical grinding machines and used for grinding cams integral with shaft.

Crankpin. Landis 10-Inch Hydraulic Crankpin Grinder. Am. Mach., vol. 67, no. 22, Dec. 1, 1927, pp. 877–878. For production grinding of pins of small motorcycle, refrigerator, or stationary engine crankshafts. See also Machy. (N. Y.), vol. 34, no. 4, Dec. 1927, pp. 310–311, 1 fig.; and Automotive Industries, vol. 57, no. 24, Dec. 10, 1927, p. 874.

Face-Mill. Oliver Face Mill Grinder. West. Machy. World, vol. 18, no. 11, Nov. 1927, p. 551, 1 fig. For sharpening face-milling cutters; grinds face and periphery of cutting blade at one pass of wheel and forms circular corner joining two; adaptable to grinding requiring radial motion of grinding wheel or combination of straight and radial grinding.

Surface. Vertical Spindle Internal and Surface-Grinding Machine. Machy. (Lond.), vol. 31, no. 788, Nov. 17, 1927, pp. 206–207, 2 figs. Specially designed for internal grinding of laminations in stator cases, though it may be equally well employed on general internal-grinding operations, where work can revolve.

Tool-Spindle. Heavy Duty Self-Contained Machine Tool Spindle Grinding Machine. West Machy. World, vol. 18, no. 11, Nov. 1927, pp. 552–553, 1 fig. Developed by Cincinnati Grinders, Inc., for giving good finish and accurate surface to large machine-tool spindles; massive wheel slide; forced lubrication of tableways.

H

HARDNESS

Indicators. "Monotron" Constant-Diameter Hardness Indicator. Forging—Stamping—Heat Treating, vol. 13, no. 11, Nov. 1927, p. 468, 1 fig. For measurement of quantitative and qualitative hardness in metals and all other materials such as minerals, glass and organic compounds like rubber; instrument is static mechanical pressure machine acting on small diamond ball impressor through specially designed high-duty weigher or pressure scale.

Testing, Dynamic. The Ball-Impact Hardness Tester (Der Kugelschlaghärteprüfer), J. Class. Forschungsarbeiten aur dem Gebiete des Ingenieurwesens, no. 296, 1927, 20 pp., 18 figs. Laws of ball-pressure test; ball impact test in comparison with ball-pressure and ball-drop test; results of experiments, their degree of precision; calibration chart of impact hardness test for steel and iron.

HEATING AND VENTILATION

Office Buildings. Saving Heat in Skyscrapers, F. C. Houghten and M. E. O'Connell. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 11, Nov. 1927, pp. 639–652, 16 figs. Air-leakage studies on metal windows in modern office building reveal effectiveness of weather-stripping in reducing heat losses. See also Dom. Eng. (N. Y.), vol. 121, no. 10, Dec. 3, 1927, pp. 23–25 and 43, 45, 47–48 and 51, 16 figs.

HYDRAULIC PRESSES

Welded. Welded Press Has 1000-Ton Capacity. Welding Engr., vol. 12, no. 10, Oct. 1927, pp. 29–31, 7 figs. When Pacific Steel Boiler Corp. needed new heavy-duty hydraulic press, conventional designs were discarded and new and unique construction was devised in order to take fullest advantage of strength and economy of welded joints.

HYDRAULIC TURBINES

Design. A Method of Obtaining the Leading Dimensions and of Setting Out the Blade-Forms for Hydraulic Turbines of the Francis Mixed-Flow and Propeller Types, H. Mawson. Instn. Civil Engrs.—Eng. Paper, no. 48, 1927, 22 pp., 8 figs. Conditions under which turbines are required to operate differ widely, and it is necessary to prepare designs for wide range of specific speeds; configuration of runner and shape of blades alter for different conditions; shows how these may be adjusted to satisfy various requirements.

HYDROELECTRIC DEVELOPMENTS

Canada. Canadian Electrical Development, F. R. Ewart. World Power, vol. 8, no. 47, Nov. 1927, pp. 246–252. Explains financial basis of Hydroelectric Power Commission of Ontario; influence of cheap electricity on development of mining, pulp and papermaking industries in Northern Ontario; effects of policy of service in development of domestic load is evidenced by citation of few convincing statistics; possibilities of power development.

Hydraulic Power Developments in British Columbia. Engineer, vol. 144, no. 3751, Dec. 2, 1927, pp. 622–623, 4 figs. on p. 630. Account of Bridge River project; Alouette, Stave Falls and Ruskin developments.

The Alouette Power Project of the British Columbia Electric Railway Co. Contract Rec., vol. 41, no. 46, Nov. 16, 1927, pp. 1160–1164, 7 figs. Construction of dam, tunnel, power house and transmission line at Alouette lakes near Vancouver.

Idaho. The Lewiston Hydroelectric Development, A. G. Darwin. West. Constr. News, vol. 2, no. 22, Nov. 25, 1927, pp. 30–36, 6 figs. Project comprises log storage, power house, dams, relocated railroad and highway; methods of concrete making.

Oregon. A $3,000,000 Hydroelectric Development in Oregon, H. P. Bosworth, Jr. Elec. Light & Power, vol. 5, no. 12, Dec. 1927, pp. 26–27, 6 figs. Construction of dam, canals, pipe lines, power house and transmission lines of No. 2 development on Rogue River by California-Oregon Power Co.

HYDROELECTRIC PLANTS

Grand Falls, N. B. Power Development at Grand Falls, N. B., A. C. D. Blanchard. Can. Engr., vol. 53, no. 22, Nov. 29, 1927, pp. 559–562, 6 figs. Constructional features of hydroelectric development for St. John River Power Co. Paper presented before Toronto Branch of Eng. Inst. of Canada.

North Carolina. Big Hydro-Electric Project in the South, C. H. Vivian. Compressed Air Mag., vol. 32, nos. 10 and 11, Oct. and Nov. 1927, pp. 2171–2177 and 2223–2228. Construction methods of plant being built at Tallassee Power Co. consisting of concrete dam, five miles of tunnel and steel-pipe conduit, 50,000-kw. generating station and transmission line. Nov.: Tunneling operations.

I

INDUSTRIAL MANAGEMENT

Charts. A Management Chart That Talks, E. Sheldon. Am. Mach., vol. 67, no. 23, Dec. 8, 1927, pp. 887–888, 3 figs. System of keeping continuous record of progress in important functions of business by means of chart and different colored cords.

Complaints, Handling. How to Handle Complaints, A. J. Smith. Indus. Mgmt. (Lond.), vol. 14, no. 11, Nov. 1927, pp. 412–413. Vital importance of complaints and their possible effect upon future business is in many works sufficient to justify appointment of special executive to deal with all such matters; where such procedure is not possible it will be found on whole that subject can better be dealt with on sales side of organization rather than production side.

Depreciation. Depreciation, J. C. Rath. Soc. Indus. Engrs.—Bul., vol. 9, no. 10, Oct. 1927, pp. 9–17. Its meaning and importance in present-day business practice.

Maintenance Supplies. Handling Maintenance Supplies in the Simmons Company Plant, M. J. Schmitt. Indus. Eng., vol. 85, no. 11, Nov. 1927, pp. 502–505, 7 figs. Methods of storekeeping in three department storerooms separate from general stores; running balance not kept on materials-record card.

Manufacturing Operations, Analysis of. How to Analyze Manufacturing Operations, A. B. Segur. Soc. Indus. Engrs.—Bul., vol. 9, no. 10, Oct. 1927, pp. 3–8. To author's mind, most accurate method, in every way, is calculation of rate from time laws of motion and from motion required to obtain quality desired on that particular operation.

Non-Productive Planning Department. Linking Maintenance with Production and Costs, C. L. Bonnett. Indus. Mgmt. (N. Y.), vol. 74, no. 6, Dec. 1927, pp. 343–349, 4 figs. Non-productive work as referred to covers that phase of work involved in furnishing and maintaining buildings, machinery, tools, gages, miscellaneous

equipment and all items that make up plant and property.

Plant-Engineering Department. Management and the Plant Engineer, K. D. Hamilton. Factory, vol. 39, no. 5, Nov. 1927, pp. 815–817 and 854. Points out that management too often overlooks direct relation which exists between operation or production expense and low maintenance costs; plant-engineering department, while not actively engaged in production, maintains and operates equipment to keep machinery in continuous production.

Production Control. Simplified Production Control, K. R. Wood. Indus. Mgmt. (N. Y.), vol. 74, no. 6, Dec. 1927, pp. 350–353, 5 figs. Describes signaling system for directing work in various divisions of plant, that brings in close touch control department and production departments, all centralized so as to be under oneman control.

Production Planning. Planning for the Small Manufacturer, F. A. R. Paton. Indus. Mgmt. (Lond.), vol. 14, no. 11, Nov. 1927, pp. 409–411. Shows how schemes may be advantageously applied to small works, and how they may be introduced.

Time Study. See TIME STUDY.

INDUSTRIAL PLANTS

Mechanization. Mechanizing of Industrial Establishments, G. F. Zimmer. Indus. Mgmt. (Lond.), vol. 14, no. 11, Nov. 1927, pp. 397–399, 3 figs. Demonstrates that while mechanizing of industry was successfully accomplished half a century ago when labor was inexpensive, logical conclusion of that fact should be universal application of such mechanizing today, when labor is so much more expensive.

INDUSTRIAL TRUCKS

Electric. Operating Costs of Electric Industrial Trucks and Tractors, C. B. Crockett and H. J. Payne. Am. Soc. Mech. Engrs.—advance paper for mtg. Dec. 5–8, 1927, 7 pp., 9 figs. Shows how direct and indirect costs of materials-handling system may be classified and estimated, and applies methods described to question of operation of electric trucks; factors affecting costs are enumerated. See also Iron Age, vol. 120, no. 24, Dec. 15, 1927, pp. 1657–1658, 1 fig.

INTERNAL-COMBUSTION ENGINES

Connecting Rods, Shocks. Shocks in Connecting-Rod Ends (Contribution à l'étude des chocs dans les têtes de bielles), A. Planiol. Technique Automobile et Aérienne, vol. 18, no. 138, May 30, 1927, pp. 76–84, 12 figs. Importance of subject; theoretical analysis on basis of old Bertin theory; experimental study of a Winterthur engine.

Corrosion. Corrosion Detected by D.O.C. Test, H. J. Young. Oil & Gas Jl., vol. 26, no. 27, Nov. 24, 1927, pp. 146–148. Severe corrosion having occurred on pins and journals of crankshafts of two motorships it fell to author to ascertain cause and if possible to find remedy; he devised what he calls direct oil-corrosion test, performed by means of apparatus whereby warm oil is run continuously over warm steel, white metal, brass, copper, or any other metal.

Exhaust-Gas Analysis. Interpretation of Exhaust Gas, C. C. Minter. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 573–575. Author explains chemistry involved in combustion in effort to arrive at more accurate knowledge of constituents of exhaust gas; sets forth simple stoichiometric relations that exist between products of combustion of hydrocarbon fuel; correction factors that must be introduced in applying these ideal relations to combustion under actual engine conditions.

Italian Congress. Italian Engineers Hold Internal Combustion Engine Congress. Automotive Industries, vol. 57, no. 25, Dec. 17, 1927, pp. 900–901. Motor fuels, detonation, control of combustion in cylinders, flexibility of engine operation and vibration discussed; tribute paid to Bernardi; transformation of gaseous mixture during working stroke; inertia phenomena in intake systems.

Triple-Chamber. Boerner Triple-Chamber Engine (Der Dreikammermotor "System Boerner"). Maschinen-Konstrukteur, vol. 60, no. 20, Oct. 31, 1927, pp. 474–476, 4 figs. Engine of very unconventional design consists of cylinder so shaped that it is divided into what amounts to three independent combustion chambers with two pistons connected by rod and arranged in such a manner that upper piston is substantially double-acting while lower is single-acting; interconnecting piston rod is oil-cooled.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON CASTINGS

Nickel and Chromium in. The Economic Value of Nickel and Chromium in Gray Iron Castings, D. M. Houston. Am. Soc. for Steel Treat.—Trans., vol. 13, no. 1, Jan. 1928, pp. 105–120 and (discussion) 120–125, 12 figs. In making use of nickel and chromium in foundry mixtures, author gives approximate equivalents to assist in determining nature of structure that may be obtained from alloy mixture compared with one of plain iron or semi-steel; illustrations of nickel-chromium mixtures developed with proper base composition whereby Brinell hardness was uniformly increased 20 to 30 points without impairing machinability at approximately same cost per pound as plain cast iron.

Properties. Centrifugal Castings for Diesel Engines, J. E. Hurst. Foundry Trade Jl., vol. 37, no. 591, Dec. 15, 1927, pp. 199–102, 5 figs. Chemical composition and properties of centrifugal castings; resistance to wear and heat conditions; spun-sorbitic centrifugal castings; two most important advantages of centrifugal over vertical sand-casting processes for production of cylindrical castings are soundness and freedom from internal defects and extreme closeness and uniformity of grain size which is reflected in mechanical strength properties of this material.

L

LIFTING MAGNETS

Steel Plates, Handling. Handling Steel Plates by Magnets, without Swinging. Iron Age, vol. 120, no. 21, Nov. 24, 1927, p. 1457. Troublesome swinging of load carried by electric magnets has been avoided by device developed by Union Metal Products Co., Hammond, Ind.; two rectangular lifting magnets are hung from spreader beam which is itself suspended by cable from monorail hoist; plates handled are charged into heating furnace one at time by an operator in control room opposite end of furnace.

LOCOMOTIVES

Diesel-Engined. Direct-Transmission Diesel Locomotives (Die unmittelbar angetriebene Diesellokomotive), O. Guenther. V.D.I. Zeit., vol. 71, no. 49, Dec. 3, 1927, pp. 1710–1716, 8 figs. Description of such locomotives; comparative study of efficiency of various types of steam, Diesel, and electric locomotives; superior economy of direct-transmission locomotives.

Exit Coal—Enter Diesel! Oil Engine Power, vol. 5, no. 11, Nov. 1927, pp. 742–743, 2 figs. What is believed to be first Diesel-powered, gear-driven locomotive built in America has been brought out by Plymouth Locomotive Works (Fate-Root-Heath Co.); power plant is a 4-cycle, enclosed-type Atlas-Imperial full Diesel engine developing 77 hp. at speed of 650 r.p.m.

Electric. See ELECTRIC LOCOMOTIVES.

Garratt. New Metre-Gauge Garratt Locomotive, Burma Railways. Ry. Engr., vol. 48, no. 575, Dec. 1927, p. 459. This engine is first of its kind to be built for modern conditions on compound principle; it weighs 103½ tons, and has tractive effort of 34,550 lb.; special feature is tire watering on application of brake.

Internal-Combustion. The First Kitson-Still Locomotive Completed. Ry. Gaz., vol. 47, no. 20, Nov. 11, 1927, p. 585, 2 figs. on p. 592. It has 2–6–2 wheel arrangement, and extra pair of cranks mounted on end of lay shaft, this shaft carrying gears through which power is transmitted from cylinders to driving axles.

Mallet. Improving Mallets on Norfolk and Western Railway. Ry. Jl., vol. 33, no. 12, Dec. 1927, pp. 18–20. Relocating air pumps, application of feedwater heaters and installing boosters on powerful locomotives; improving efficiency of 10 locomotives of Y-3 and Y-3a type.

Oil-Electric. Oil-Electric Locomotive Shows Fitness for Passenger Service. Compressed Air Mag., vol. 32, no. 12, Dec. 1927, p. 2251. Results of test which consisted of run of 183.7 miles on Erie Railroad from Hornell, N. Y., to Meadville, Pa.; performance was outstanding success.

Pulverized-Coal-Fired. German Pulverized-Coal-Fired Locomotive (Die AEG-Kohlenstaub-Lokomotive). Wärme u. Kälte-Technik, vol. 29, no. 21, Oct. 19, 1927, p. 277, 1 fig. Built by A.E.G. and tested in freight service near Berlin; tender is completely enclosed and instead of coal carries boiler-like container filled with pulverized coal; it is stated that tests were very successful.

Steam-Turbine. 2000-H.P. Ljungström Turbine Locomotive. Engineering, vol. 124, nos. 3231 and 3232, Dec. 16 and 23, 1927, pp. 771–774 and 801–804 and 812, 32 figs., on supp. plates. Locomotive designed for express passenger traffic and constructed by Beyer, Peacock and Co., Manchester; designed so as to be capable of hauling English express trains at maximum speed of 75 m.p.h.; in spite of its exceptional haulage powers, it consumes less fuel than standard express engine; another valuable characteristic is its large starting torque.

Stoker Firing. Stoker Firing of Engines. Ry. Jl., vol. 33, no. 12, Dec. 1927, pp. 33–34. Subcommittee's report before Ry. Fuel Agents Convention. There is still, without doubt, great opportunity on most railroads to effect further reduction in fuel consumption on locomotives through improved firing practice.

Superheater. The IDI Model of Superheater Tender Locomotives of Mecklenburg-Friedrich-Wilhelm Railway Company (IDI-Heissdampf-Tenderlokomotive der Mecklenburgischen Friedrich-Wilhelm-Eisenbahn-Gesellschaft), R. Opitz. Verkehrstechnik, vol. 40, no. 46, Nov. 18, 1927, pp. 806–808. Characteristics of new locomotive model, 89 tons in weight, 13.4 m. long, with speed of 65 km. per hr.; developed and manufactured by A.E.G.

LUBRICATION

System for Machines. Dot Centralized Lubricating System. Am. Mach., vol. 67, no. 24, Dec. 15, 1927, pp. 953–954, 2 figs. Number of bearings upon machine or group of machines or upon line and countershaft oiled simultaneously from central point; comprises pump or means to introduce oil, metering valve, knuckle relief valve, pipe and fittings; hand or power operation.

LUMBER

Drying. The Practicability of Drying Green Lumber, W. L. Willard. Woodworker, vol. 46, no. 9, Nov. 1927, pp. 35–37, 2 figs. Drying of green or nearly green stock is phase of lumber treatment which is receiving more and more attention; lumber should be thoroughly dried at point of production, and in most economical manner; emphasizes practicability of drying green stock successfully. Offsets erroneous impression that air seasoning is essential factor in successful drying of lumber.

M

MACHINE SHOPS

Power Distribution. Power Distribution in a Large Machine Shop, F. E. Gooding and C. E. Brown. Indus. Eng., vol. 85, no. 11, Nov. 1927, pp. 520–522, 8 figs. Cincinnati Milling Machine Co.'s layout for power and lighting; a.c. and d.c. used purchased from outside; 150 kw. of a.c., 150 kw. of d.c. is maximum power requirement.

MACHINE TOOLS

Lubrication. Lubricating Machine Tool Bearings, F. Horner. Can. Machy., vol. 38, no. 21, Nov. 24, 1927, pp. 15–18, 11 figs. Discusses and illustrates variety of ways in which machine-tool lubrication may be accomplished for preservation of bearing surfaces against frictional deterioration or seizure.

Multi-Automatic. Bullard 20-Inch Six-Spindle Mult-Au-Matic. Am. Mach., vol. 67, no. 23, Dec. 8, 1927, p. 920, 1 fig. Adaptable to heavy work, short runs and frequent set-up changes; spindle speeds independently obtainable at each station; tool feeds independently variable for each head; main clutch-control lever at each station; power or hand operation of each tool head. See also Iron Age, vol. 120, no. 23, Dec. 8, 1927, p. 1595, 1 fig.

Standardization. Tool Standardization. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 576–578, 4 figs. Tools and details of jigs and fixtures standardized in Beloit plant.

Swaging. Dayton-Torrington Improved 4-Die Swaging Machine. Am. Mach., vol. 67, no. 23, Dec. 8, 1927, pp. 921–922. Increased capacity for No. 3 size.

MACHINING METHODS

Lobe-Shaped Bores. Machining Casting with Lobe-Shaped Bore. Machy. (Lond.), vol. 31, no. 787, Nov. 10, 1927, pp. 180–181, 4 figs. Fixtures and tools designed for machining operations on exhaust-pump castings.

MAGNESIUM ALLOYS

High-Magnesium. High Magnesium Alloys (Beitrag zur Kenntnis der hochprozentigen Magnesiumlegierungen), W. Schmidt. Zeit. für Metallkunde, vol. 19, no. 11, Nov. 1927, pp. 452–455, 24 figs. Laboratory studies of properties of following alloys: aluminum-magnesium, zinc-magnesium, lead-magnesium, manganese-magnesium.

MANGANESE STEEL

Low-Carbon. Some Characteristics of Low-carbon Manganese Steel, V. N. Krivobok, B. M. Larsen, W. B. Skinkle and W. C. Masters. Am. Inst. Min. & Met. Engrs.—Tech. Publication, no. 24, Nov. 1927, 30 pp., 32 figs. It can be manufactured in either basic or acid open-hearth or electric furnaces, available manganese alloys giving any desired composition; finishing of manganese heat in furnace, and use of silico-manganese for making low-carbon heats involve special problems in furnace operation which are not yet entirely solved and deserve further study; it may be useful chiefly in field of cheaper alloy steels, where large tonnages are desired of steel with properties superior to those of ordinary open-hearth carbon steels; double heat treatment is necessary to bring out best properties.

MATERIALS HANDLING

Dumping Machinery. Mechanical Dumping (Maschineller Kippbetrieb), F. Heintze. Bautechnik, vol. 5, no. 48, Nov. 4, 1927, pp. 695–698, 8 figs. Construction and operation of Krupp and other German elevating and dumping belt conveyors, on booms as long as 72 m., combined with bucket excavators; uses in mining, dam construction, earthwork, etc.

Pneumatic. Pneumatic Transportation of Materials with Particular Reference to Wood Shavings (Die Berechnung der Spänetransport-Anlagen im besonderen und der pneumatischen Material-Transporte im allgemeinen), S. Grakhan. Fördertechnik u. Frachtverkehr, vol. 20, nos. 22 and 23, Oct. 28 and Nov. 11, 1927, pp. 383–387 and 400–404, 12 figs. Principles of design and computation with formulas and charts; numerical example; table of design data.

METAL WORKING

Stamping. Shaping without Cutting (Arbeitsbedingungen für wirtschaftliche spanlose Formgebung), O. Kühner. Werkstattstechnik, vol. 21, no. 21, Nov. 1, 1927, pp. 629–635, 7 figs. Experimental study of action and economic operation of stamping machinery, such as friction screw presses, stamping presses, etc., with special reference to mass production.

METALS

Cold-Rolled. The Structure of Cold-Rolled Metals (Beiträge zur Kenntnis der Struktur kaltgewalzter Metalle), F. Wever and W. Schmidt. Mitteilungen aus dem Kaiser-Wilhelm-Institut für Eisenforschung zu Düsseldorf, vol. 9, no. 17, paper no. 90, 1927, pp. 265–272, 39 figs. partly on supp. plates. Deals with structure analysis of rolled aluminum, copper and silver; recrystallization process of aluminum.

Impurities. Impurities. Metallurgist (Supp. to Engineer), Nov. 25, 1927, pp. 162–163. In cases mentioned effects of impurities are most important from point of view of mechanical properties of metals and alloys concerned; from viewpoint of electrical industry, however, electrical and magnetic properties are even more important, and this opens up wider field of research and one involving study of much more minute quantities of impurity as affecting properties of high-purity metals.

Machinability. Machinability of Metals, O. W. Boston. Am. Soc. Steel Treat.—Trans. vol. 13, no. 1, Jan. 1928, pp. 49–86 and (discussion) 86–94, 29 figs. Outline of various methods used to designate machinability; gives under heading of each method, outline of work done by various authors as published in few outstanding papers on subject; machinability may refer to relative machining qualities of several metals under same conditions or to those of given metal under varying conditions. Bibliography.

Microscopic Examination. The Microscopic Examination of Engineering Materials, A. B. Everest. Rugby Eng. Soc.—Proc., vol. 21, 1926–1927, pp. 15–36, 31 figs. Demonstrates how microscope is becoming more and more basis of testing of many engineering materials; microstructure of metals, and its relation to thermal and mechanical treatment; in special case, relation between microstructure and physical properties of series of alloys is discussed, showing how, within limits, microscope can form basis of investigation of such series; micro-examination of some special materials, notably of electrical insulators.

MICROMETERS

Pratt & Whitney Supermicrometer. The Pratt and Whitney Supermicrometer. Engineering, vol. 124, no. 3230, Dec. 9, 1927, pp. 747–748, 8 figs. on p. 750. Instrument which occupies position intermediate between ordinary micrometer calipers and an elaborate measuring machine, is intended for general use by toolmakers, inspectors and mechanics, in shops where measurements of 1/10,000 in. are required.

MOLDING METHODS

American Practice. American Foundry Practice. Foundry Trade Jl., vol. 37, no. 586, Nov. 10, 1927, p. 102, 3 figs. Molding methods in America are very different from British, and this difference is constituted of many items such as extended use of wooden molding boxes; large number of snap-flask boxes; varying qualities of molding sand; different bonds used in sand; and many small items which tend to create speed.

Templet. Up-to-Date Templet Sand Molding (Neuzeitliche Sandschablonenformerei), C. Schrage. Giesserei-Zeitung, vol. 24, no. 21, Nov. 1, 1927, pp. 589–596, 7 figs. Economics and practical technique of templet molding; modern methods and apparatus used in making round castings, wheels and machine parts of unusual and complex forms; use of auxiliary patterns.

MOLDS

Closing. Easier Mold Closing. Iron Age, vol. 120, no. 25, Dec. 22, 1927, p. 1718, 2 figs. Turntable in interrupted right-angle conveyor facilitates placing cope; development by Osborn Mfg. Co., Cleveland.

Driers. Electric Mold-Drying Unit. Iron Age, vol. 120, no. 21, Nov. 24, 1927, p. 1456. Heating unit for drying large sand molds in brass, steel or iron foundries, designed by Gen. Elec. Co. to obviate attention required by kerosene lamps, stoves, coke or coal fires usually employed.

Water-Cooled. Water-Cooled Molds in Brass Foundries. Metal Industry (Lond.), vol. 31, no. 20, Nov. 18, 1927, pp. 465–466, 7 figs. Probably most serviceable and convenient type of chill mold is Junker water-cooled mold; these molds are scientifically designed and calculated to give continuous and effective service of precisely the nature to give best physical structure, density and condition in resulting slabs, and therefore, to produce ultimately far better and more uniform sheets than can be obtained by use of old-fashioned cast-iron chill molds.

MOTOR BUSES

Design. Motorcoach Design, K. J. Ammerman. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 653–659, 6 figs. Topics discussed include effects of excessive overhang, importance of proper weight distribution, baggage problem, value of sturdy appearance, economy of standard body building and costs imposed by deviations from standardized design; methods of construction; views of several leading types of motor coach.

General Motors Co. New General Motors Buses Powered with Buick Engines, A. F. Denham. Automotive Industries, vol. 57, no. 23, Dec. 3, 1927, pp. 834–835. Two chassis, designed for city and school service, respectively, are announced; former has wheelbase of 162 in.; school bus seats 42, city 21, balloon tires used, dual on rear.

Lancia. The New Six-Cylinder Lancia. Motor Transport, vol. 45, no. 1183, Nov. 14, 1927, p. 626, 2 figs. Low-loading passenger chassis of advanced design known as the "Omicron."

Olympia Show, England. The Commercial Vehicle Exhibition at Olympia. Engineering, vol. 37, nos. 3227, 3228 and 3229, Nov. 18, 25 and Dec. 2, 1927, pp. 655–658, 694–696 and 703–705, 55 figs. partly on supp. plates. Tendency in design as featured by exhibits; it is considered essential that commercial vehicles, particularly those of passenger type, should be capable of relatively high speeds, and this has led to adoption of highly efficient engines; employment of low-level frames. See also Elec. Ry. & Tramway Jl., vol. 57, no. 1426, Nov. 18, 1927, pp. 324–340, 34 figs., and Engineer, vol. 144, nos. 3749 and 3750, Nov. 18 and 25, 1927, pp. 566–568 and 596–598, 13 figs.

Street-Car Type. Will New Street Car Models Extend Economic Field of the Bus? D. Blanchard. Automotive Industries, vol. 57, no. 25, Dec. 17, 1927, pp. 894–897, 5 figs. Increased carrying capacity to give wider field without offsetting increase of operating costs; three makes on market; body maintenance uncertain, reduced storage costs.

White. New White 54 Bus Has Interesting Mechanical Details. Automotive Industries, vol. 57, no. 24, Dec. 10, 1927, pp. 876–878, 5 figs. Six-cylinder chassis, model 54, 1A1; monoblock, overhead-valve type; positive valve-stem lubrication, salt-cooled valves; self-cleaning oil-pump screen; two-spark ignition; special rear-wheel fastening.

MOTOR-TRUCK TRANSPORTATION

Fleet-Operating Costs. Using Truck-Operating Costs to Increase Delivery Efficiency, A. W. Herrington. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 535–538, 2 figs. In line with devising standard method of recording fleet-operating costs so that they can be utilized comparatively, author cites supposed company in retail dairy business which has fleet of 30 vehicles, assumes definite monetary values for several factors constituting total cost, and analyzes entire problem in way to demonstrate fundamental principles of comprehensive system of accounting that will make evident all information sought.

Railway and. Coordinated Rail and Motor-Truck Transportation, G. W. Dixon. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 680–681. Five principal uses for motor truck and two secondary uses, are cited; analysis is made of each of motor-truck usages mentioned; it is stated that motor truck and semi-trailers bid fair to become economical auxiliaries to all-rail transportation.

MOTOR TRUCKS

Ford. Ford Offers Auxiliary Transmission for Truck. Automotive Industries, vol. 57, no. 24, Dec. 10, 1927, p. 857. Models of $1^1/_2$ tons with single rear wheels and of $2^1/_2$ tons with dual rear wheels; 4-wheel brakes, worm-drive rear axles, torque tube drive, cantilever rear springs, welded steel-spoke wheels; three-speed sliding-gear transmission with two-speed auxiliary transmission added at extra cost. Inclosed, cab and express, stake and platform bodies available. See also Operation & Maintenance, vol. 36, no. 6, Dec. 15, 1927, pp. 14–16, 7 figs.

General Motors. Six-cylinder G.M.C. Models. Motor Transport, vol. 45, no. 1181, Oct. 31, 1927, pp. 539–540. Two new chassis for 50-cwt. and 30-cwt. loads; 4-wheel brakes on larger machine.

Mack. New High-Speed, Heavy-Duty Mack Truck Announced, J. W. Cottrell. Automotive Industries, vol. 57, no. 25, Dec. 17, 1927, pp. 898–899, 3 figs. Rated at $3^1/_2$ to 5 tons; 4-wheel brakes; high compression 4-cylinder engine; 4-speed transmission and rubber spring mountings; centrifugal air cleaner; single-plate clutch; accessible gearbox.

Glimpses of Mack Production, S. J. Koshkin. Am. Mach., vol. 67, nos. 21, 23 and 25, Nov. 24, Dec. 8 and 22, 1927, pp. 811–814, 899–902 and 967–970, 32 figs. Machine shops at New Brunswick plant. Dec. 8: Machining transmission cases and differential housings. Dec 22: Heat-treatment and laboratory tests at New Brunswick plant.

Oil Tank. Semi-Trailers and Trailers Permit Hauling Carload at One Time. Nat. Petroleum News, vol. 19, no. 47, Nov. 23, 1927, pp. 26–27, 3 figs. Six-wheel semi-trailer tank truck with 3500-gallon tank; Standard Oil Co. of New Jersey has two of these units in operation; with two 2000-gallon trailers which builders say can be handled, this unit could carry 7500 gallons of gasoline, or almost tank carload.

Olympia Show, England. Many New Six-Wheel Models at London Truck Show, M. W. Bourdon. Automotive Industries, vol. 57, no. 23, Dec. 3, 1927, pp. 820–823. 6-cylinder engines also increase in number and higher speed is built into light jobs; pneumatic tires are used in most cases; two sleeve-valve engines.

The Commercial Vehicle Show. Auto-Motor Jl., vol. 32, no. 47, Nov. 24, 1927, pp. 1001–1004, 7 figs. Review of exhibits at International Commercial Motor Transport Exhibition.

Tank Trailer. Frameless Tank Trailer Saves Weight; Carries Great Gallonage. Power Wagon vol. 39, no. 275, Nov. 1927, pp. 46–49. 3500-gal. tank reinforced by trussing serves as carrying member, while lower center of gravity is secured by recessing of tank front mounted on new type fifth wheel.

N

NICKEL ALLOYS

Nickel Cast Iron. Nickel Cast Iron, A. E. Hanson and E. J. Bothwell. Tech. Eng. News, vol. 8, no. 6, Nov. 1927, pp. 258–259 and 278, 4 figs. Description of properties of this new alloy, with reference to its economical use as engineering material.

NUTS

Driving Machines. Reynolds Nut-Driving Machine. Am. Mach., vol. 67, no. 32, Dec. 1, 1927, pp. 872–873, 2 figs. Such work as assembling of bearing caps, valve bonnets, motor end plates, connecting rods preparatory to reaming, or any work that requires nuts or caps to be driven and tightened in pairs, can be performed on two-spindle machine made by Metalwood Mfg. Co. See also Automotive Industries, vol. 57, no. 24, Dec. 10, 1927, pp. 874–875, 1 fig.

O

OIL ENGINES

Developments. Oil Engines, J. F. Alcock. Instn. Petroleum Technologists—Jl., vol. 13, no. 63, Aug. 1927, pp. 601–607. Chief feature of year is construction of high-powered engines, mostly for passenger liners; high-speed engines; two-stroke engines; fuel injection; supercharging; hot-bulb engines.

Heavy-Oil. Economics of the Crude Oil Engine Plant, J. H. Dodd. Commonwealth Engr., vol. 15, no. 2, Sept. 1, 1927, pp. 54–56, 1 fig. During past five years considerable progress has been made in Australia in connection with installation of crude-oil engine plants; these installations have been mainly for generation of electrical energy.

Lubrication. How Lubricating Oil Can Retain Its Youth, B. C. Oldham. Power, vol. 66, no. 21, Nov. 22, 1927, pp. 788–791, 3 figs. At least three problems are involved in lubrication of oil engines; one is method employed, another is selection of suitable grade of oil, and third is manner in which oil is handled; lubrication within crankcase; trunk-piston engine lubrication; carbon troubles.

Supercharging. A New System of Supercharging. Mar. Engr. & Motorship Bldr., vol. 50, no. 603, Nov. 1927, pp. 415–416, 2 figs. With object of obtaining more power from given cylinder volume than is possible with their standard system of scavenging with double row of superimposed parts, Sulzer Bros. Switzerland, have developed new method of supercharging two-stroke cycle heavy-oil engines of their design, whether of land or marine type; essential feature of new method consists in introducing certain quantity of charging air at about 0.8 atmos. pressure into working cylinder immediately after the termination of the normal scavenging process.

OIL FUEL

Auto-Ignition Temperature. Study of Auto-Ignition Temperatures, H. J. Masson and W. F. Hamilton. Indus. & Eng. Chem., vol. 19, no. 12, Dec. 1927, pp. 1335–1338, 1 fig. Study of various factors affecting auto-ignition temperatures; as result new form of apparatus has been developed of high accuracy and sensitivity together with simplicity of construction and operation; apparatus and technic may be modified to determine auto-ignition temperatures of solids and gases in any surrounding atmosphere at ordinary or increased pressures.

House Heating. Mercoids Features Forecast of Oil-Burner Development, P. E. Fansler. Heat. & Vent. Mag., vol. 24, no. 11, Nov. 1927, pp. 110–111. Author conceives of home having in its celler, or buried in ground, machine that will make from common oil fuels, stable gas, in quantities and at times wanted; machine might be of instantaneous type, making gas exactly as required, or it might incorporate small storage, maintaining this reserve always at definite minimum; this stable gas can be piped into and through home, supplying heat from combustion taking place in a specially designed heating plant that conceivably might show overall efficiency of 90 per cent; gas from same source would supply kitchen stove, domestic water heater, refrigerating unit, air-conditioning plant, etc.

Measuring. Measuring Fuel Oils, A. F. Brewer. Indus. Power, vol. 8, no. 6, Dec. 1927, pp. 56–58, 3 figs. In fuel-oil burning systems both horizontal and vertical shortage tanks are encountered; to gage or measure amount of fuel in such tanks, depth of oil can either be measured directly, or distance from a fixed or gaging point at top of tank to surface of oil can be taken; by the first method so-called "innage" is determined; the second method is termed measuring "outage."

Synthetic. Synthetic Fuels, A. W. Nash and O. C. Elvins. Instn. Petroleum Technologists—Jl., vol. 13, no. 63, Aug. 1927, pp. 597–601. Review of progress; pressure process for methyl alcohol is commercial success; it can be modified to yield liquids suitable for use as fuels, but evidence is not yet forthcoming that such modifications will be economic success; hydrocarbon formation at atmospheric pressure holds much that is promising for future of synthetic gasoline.

OPEN-HEARTH FURNACES

Refractories. Open-Hearth Steelworks Refractories, A. T. Green. Foundry Trade Jl., vol. 37, no. 583, Oct. 20, 1927, pp. 50–52. Bricks for port and top courses; highly converted silica unsuitable for open hearth; corrosion and erosion of open-hearth silica bricks; mechanism of corrosion and erosion; bricks from furnace roofs; thermal characteristics of chequerwork; materials for regenerators.

OXYACETYLENE CUTTING

Economical Applications. Economical Oxyacetylene Cutting Needs Intelligent Supervision, J. L. Anderson. Iron Trade Rev., vol. 81, no. 23, Dec. 8, 1927, pp. 1421–1423 and 1428, 3 figs. Calls attention to importance of oxyacetylene cutting process from oxygen-consumption standpoint; factors that enter into economical application of this process.

Oxygen-Jet. Godfrey Oxygen-Jet Cutting Machine. Am. Mach., vol. 67, no. 24, Dec. 15, 1927, pp. 955–956, 1 fig. Cuts any thickness of steel up to 10 in. in depth and adjusted to any angle up to 45 deg.; oxyacetylene flame for heating and stream of oxygen gas for cutting both cut off by master control lever without disturbing adjustment of gas mixture; exact adjustments repeated.

OXYACETYLENE WELDING

Annealing Pipe Joints. Annealing Welded Pipe Joints. Acetylene Jl., vol. 29, no. 5, Nov. 1927, pp. 195–196, 3 figs. High-pressure steam main, 18 in. in diameter with steel wall $^1/_2$ in. thick was constructed with chamfered edges for oxyacetylene welding of joints; following completion of each weld, all joints were annealed six inches on each side of weld, being heat treated with use of McKneat atomizing burner.

Engine Castings. Oxyacetylene Welding of Oil Engine Castings. Oil Engine Power, vol. 5, no. 12, Dec. 1927, pp. 829–830, 1 fig. Problems involved in welding large complicated gray-iron castings such as are used in oil engines consist mainly in controlling heat of welding operations so that there will be no warping out of true nor cracking due to internal stresses.

Pipe Lines. 500,000 Ft. of Welded Piping in One Building, C. Kandel. Acetylene Jl., vol. 29, no. 5, Nov. 1927, p. 202. In erection of new 16-story Nurses' Home forming part of Mt. Sinai Hospital, New York, all steam, brine and hot-water pipe lines are welded.

Practical Applications. Practical Oxy-Acetylene Welding, R. Granjon, P. Rosemberg and A. Desgranges. Welding Jl., vol. 24, nos. 284, 285, 286, 287, 288 and 289, May, June, July, Aug., Sept. and Oct. 1927, pp. 140–143, 174–176, 208–211, 237–239, 264–266 and 319–321, 142 figs. May: Welding of cast iron. June: Special and malleable cast iron; welding of aluminum. July: Light alloys of aluminum. Aug.: Duralumin and special alloys; welding of copper. Sept.: Welding of brasses. Oct.: Bronzes and miscellaneous metals and alloys.

Pressure Vessels. Searching Tests of Welded Joints. Iron Age, vol. 120, no. 21, Nov. 24, 1927, pp. 1445–1446. Sponsored by International Acetylene Assn. in study of pressure vessels; value of various gases for cutting flame compared.

Steam Pipes. Built for the Ages. Oxy-Acetylene Tips, vol. 6, no. 4, Nov. 1927, pp. 61–62, 4 figs. Welded steam piping for heating and snow removal sealed permanently in masonry walls of great cathedral on Morningside Heights in New York City.

P

PIPE, CAST-IRON

Bronze-Welded Joints. New High Strength Joint. Oxyacetylene Tips, vol. 6, no. 4, Nov. 1927, pp. 72–76, 5 figs. Shear-vee type joint for bronze-welding cast-iron pipe develops practically full strength of pipe.

An Improved Joint Design for Bronze-Welded Cast Iron Pipe, T. W. Greene and F. G. Outcault. Gas Age-Rec., vol. 60, no. 20, Nov. 12, 1927, pp. 741–742, 4 figs. Average results of tests indicate that strength of bronze collar joint is only about 55 per cent of strength of pipe.

PNEUMATIC TOOLS

Riveting and Drilling. Pneumatic Tools for Riveting, Drilling and Other Operations. Iron Age, vol. 120, no. 23, Dec. 8, 1927, p. 1596, 1 fig. Semi-portable radial pneumatic general-purpose tool of Guardian Products Co., Cleveland, consists of frame that swings on wall bracket, air-operated mechanism and pneumatic hammer that is clamped to two arms that form outer end of frame.

Uses of. Some New Uses for Pneumatic Tools, A. P. Darcel. Can. Engr., vol. 53, no. 22, Nov. 29, 1927, pp. 569–572, 5 figs. Brief survey of air tools used in timber construction work; records of performance; labor-saving features; where air tools are used; use of tools on dock construction at Wolfe's Cove, P. Q.

PRESSES

High-Speed. High-Speed Punch Press. Iron Age, vol. 120, no. 26, Dec. 29, 1927, p. 1791, 1 fig. Increased life of tools on high-speed punching operations is made for new press brought out by E. W. Bliss Co., designed to operate at 300 strokes per min.

Punch. Power Press for Heavier Gage Work in Jobbing and Production Shops. Iron Age, vol. 120, no. 26, Dec. 29, 1927, p. 1789, 1 fig. Service Machine Co., Elizabeth, N. J., has brought out punching press of improved design, which is combination of adjustable bed and deep-throat punching press and has capacity of 30 tons pressure near bottom of stroke.

PRODUCER GAS

Boiler Firing. The Application of Producer Gas Firing to Waste-heat Boilers, C. F. W. Rendle. Gas World, vol. 87, no. 2258, Nov. 12, 1927, pp. 450–457 and (discussion) 457–458, 7 figs. Describes new plant working on such lines which has been installed at Redditch; reasoning which led to adoption of boiler dealing jointly with flue gases from retort settings and products from combustion of producer gas made in separate producer. See also Gas Jl., vol. 180, no. 3365, Nov. 16, 1927, pp. 451–457, 8 figs.

PULLEYS

Compressed Spruce. Compressed Spruce Pulleys and Gears. Chem. & Met. Eng., vol. 34, no. 12, Dec. 1927, p. 766, 2 figs. Laminated spruce blocks are being used in manufacture of wide variety of sizes of gears and pulleys.

PULVERIZED COAL

Central Stations. Pulverized Fuel Plants, L. C. Harvey. World Power, vol. 8, no. 47, Nov. 1927 pp. 262–270, 12 figs. Economic possibilities of pulverized fuel for power-house applications lie not alone with central system, but with recently developed self-contained unit system; for superpower-station purposes central system is advocated, but for lesser power station examples are cited in evidence of advance made with unit pulverizer equipment; progress has been due to reduction in equipment cost, cost of maintenance of mill parts, power consumption, and by introduction of turbulent mixing of fuel and air supplies.

Fineness, Determination of. Determination of Fineness of Pulverized Coal (Ueber die Bestimmung der Feinheit von Kohlenstaub), C. Förderreuther. Braunkohle, vol. 26, nos. 30 and 32, Oct. 22 and Nov. 5, 1927, pp. 689–695 and 735–740, 18 figs. Discusses sieve method as to usual errors, their elimination or discounting; author's sieve apparatus, its operation, tests.

Marine Boilers. Pulverized Coal Tests of Marine Watertube Boiler, T. B. Stillman. Mar. Eng. & Shipg. Age, vol. 32, no. 12, Dec. 1927, pp. 669–675, 12 figs. Results of tests with standard Babcock and Wilcox water-tube boiler show that pulverized coal can be burned efficiently at high rates of combustion; directly comparable tests using oil, pulverized coal and hand-fired coal were made on this same boiler; efficiency curve of these three methods of firing is shown.

Pulverizers. The Rema Pulverising Mill. Eng. & Boiler House Rev., vol. 41, no. 5, Nov. 1927, p. 239, 2 figs. Low-speed pulverizing mill embodies free-running grinding ring made of manganese or other very hard steel, inside which three specially hard crushers revolve, top crusher being mounted on driving shaft and forming driver.

Turbulent Burners for. Turbulent Burners for Pulverized Coal, S. C. Martin. Power Plant Eng., vol. 31, no. 22, Nov. 15, 1927, pp. 1181–1185, 12 figs. To secure proper mixture of pulverized coal and combustion air and to shorten flame travel, thus decreasing furnace volume, various types of burners have been developed.

PUMPS

Air-Jet Lift. The Air-Jet Lift, S. C. Martin. Indus. & Eng. Chem., vol. 19, no. 12, Dec. 1927, pp. 1346–1348, 4 figs. Device comprises arrangement of piping and valves connected by foot piece which constitutes pump proper, together with compressed-air supply pipe and eductor or discharge pipe; equipment required for operation of lift consists of compressor, air receiver, necessary pipe lines and discharge piece or fitting.

Propeller. Propeller Pumps Proposed for Condenser Service, R. K. Annis. Power, vol. 66, no. 26, Dec. 27, 1927, pp. 1002–1005, 10 figs. Characteristics of propeller- or screw-type and of centrifugal pump are compared, and suggestions are made for applying former to condenser service.

R

RADIATORS

Testing. Proposed Methods for Testing Radiators, F. C. Haughten and S. R. Lewis. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 33, no. 12, Dec. 1927, pp. 697–706, 1 fig. Defines radiators, castings, relation of radiator room and occupant and describes ideal and practical test room with methods of testing.

RAILS

Transverse Fissures. Transverse Fissure Still a Mystery. Iron Age, vol. 120, no. 21, Nov. 24, 1927, p. 1435. There is no inherent reason for attaching responsibility for display of transverse fissures in rails to manufacturing conditions, either in making or rolling of steel, according to conclusions reached by Bur. of Safety, Interstate Commerce Commission, on basis of investigations it has conducted.

RAILWAY MOTOR CARS

Diesel-Electric. The First All-American Diesel Rail Car. Oil Engine Power, vol. 5, no. 12, Dec. 1927, pp. 839–855, 13 figs. Description of Foos Diesel replacing old gasoline engine; also electric drive and its advantages; after month of operation on run between Monticello and Calmar, Iowa, indications are that on 200-mile trip per day there will be saving of from $3500 per year for fuel alone.

Steam. Rail Car Driven by Steam. Ry. Mech. Engr., vol. 101, no. 12, Dec. 1927, pp. 768–771. International Harvester high-pressure power plant, also adaptable to switch engine drive, is distillate-burning, direct mechanical-drive unit designed to be noiseless, smokeless and easy riding, with ample power for hauling additional trailer tonnage, known as "Locomotor;" but one operator is required; passenger-baggage car 73 ft. long for 63 passengers. See also Fuel Oil, vol. 6, no. 6, Dec. 1927, pp. 54 and 56, 1 fig.

Street-Railway Service. Mexican Street Cars Are Powered with Automobile Motors, T. Croft. Elec. Ry. Jl., vol. 70, no. 21, Nov. 19, 1927, pp. 933–935. In Merida, Yucatan, cars are all driven by standard Ford automobile engines; standard Ford parts are used wherever feasible; Ford gasoline tank is installed either horizontally under car seat or vertically in vestibule.

RAILWAY OPERATION

Train Control. Train Control Equipment on the C. & O. Ry. Elec. Engr., vol. 18, no. 11, Nov. 1927, pp. 373–379, 2 figs. Intermittent inductive type used on greater portion of line; testing device and methods for checking operation of apparatus.

RAILWAY SIGNALING

Automatic. Buffalo, Rochester & Pittsburgh Has High Standard of Signal Maintenance. Ry. Signaling, vol. 20, no. 12, Dec. 1927, pp. 463–468. Signals are G.R.S. Model 2A, top-post mechanism except for distance of 24.91 mi., where Model 2A a.c. signals are in use; signals have been in service about 14 years; explanation of methods followed in signal-department maintenance program.

Automatic Block. Color-Light Automatic Block Signals Installed on the New York Central. Ry. Signaling, vol. 20, no 12, Dec. 1927, pp. 451–455. Line control employed with center-fed track circuits; special switch relays used to eliminate necessity of carrying line wires through switch boxes; equips West Shore line on section of West Shore from Selkirk, N. Y., to Utica and from Syracuse west to Buffalo.

RAILWAY TRACK

Buckling Strength. Welding of Rails and Buckling Strength of Railway Tracks (Schienenschweissung auf der freien Strecke und Knickfestigkeit der Eisenbahngleise), A. Wöhrl. Organ für die Fortschritte des Eisenbahnwesens, vol. 82, no. 20, Oct. 30, 1927, pp. 384–390, 4 figs. Broekman mathematical analysis of buckling of straight and curved track rails and its bearing on project of continuous welded tracks.

RAILWAY YARDS

Car-Repair Tracks. Modern Car Repair Tracks. Ry. Mech. Engr., vol. 101, no. 12, Dec. 1927, pp. 789–791. Central of New Jersey improves facilities at its Penobscot classification yard; Ashley planes unique feature in railroad operation; short time in which cars containing rush shipments can be repaired and returned to service is one of features in operation of repair tracks.

Car Retarders. Modern Yard Operation, W. B. Rudd. Can. Ry. Club—Official Proc., vol. 26, no. 7, Oct. 1927, pp. 21–29. Points out advantages of car retarder for hump-yard operation.

RESEARCH

Scientific. Specialization and Cooperation in Scientific Research, K. T. Compton. Science, vol. 66, no. 1715, Nov. 11, 1927, pp. 435–442. Suggests accomplishments and opportunities of research and indicates directions in which to bring about even more fruitful service of science to society in future.

ROLLING MILLS

Blooming Mills. Reversing-Blooming-Mill Practice, G. A. Russell. Mech. Eng., vol. 49, no. 12, Dec. 1927, pp. 1331–1334. Résumé of current practice, dealing with cogging, drafting practice, driving main rolls, reversing steam engines and motor drives, mill-train design, etc.

Calculations. Rolling Mill Calculations, J. D. Keller. Iron & Steel World, vol. 1, nos. 1, 2, 3, 4 and 5, Feb., Mar., Apr., May and June, 1927, pp. 37–42, 127–130, 199–200, 271–276 and 343–346, 20 figs. Analysis of stresses in 44-in. blooming mill for determining constants for use in design of new mills. Feb.: Gripping or biting of steel by rolls; stresses in rolls. Mar.: Maximum bearing pressure on roll necks; stresses in housings, screws and screw box. Apr.: Torsional strength of spindles and wobbler; stresses in pinions. May: Means to prevent overheating of motors. June: Time in mill approximately equals time on tables.

Electric Drive. Cold Rolling Mill of Recent Design, E. W. Duston. Blast Furnace & Steel Plant, vol. 15, no. 11, Nov. 1927, p. 551, 1 fig. Special design of electrically driven mill of six units which offers several distinct advantages, especially in manufacture of bolts and nuts.

Main Drives 10" Merchant Mill at McKinney Steel Company, A. F. Kenyon. Iron & Steel Engr., vol. 4, no. 11, Nov. 1927, pp. 455–457, 7 figs. Mill has roughing train driven by 1000-hp., 200/600-r.p.m. motor, intermediate train driven by 2000-hp., 187/275-r.p.m., motor and four finishing stands driven by 1200-hp. 300/550-r.p.m. motor.

ROPE DRIVE

Calculations for. Rope Transmission, L. T. Rutledge. Can. Machy., vol. 38, no. 23, Dec. 8, 1927, pp. 15–16. American or continuous drive English or multiple-rope drive.

S

SAND, MOLDING

Control. Practical Molding Sand Control. N. D. Ridsdale. Foundry Trade Jl., vol. 37, no. 585, Nov. 3, 1927, pp. 79–82, 9 figs. Deals mainly with green sands such as are used for iron and brass founding, and indicates nature and value of small-scale tests both within and without laboratory for assisting practical molder to use his sands to best advantage.

SAWS

Band. American Methods of Treatment of Band-Saw Blades (Die amerikanischen Methoden zur Behandlung der Bandsägeblätter und ihre elastizitätstheoretische Begründung), G. Schmaltz. V.D.I. Zeit., vol. 71, no. 47, Nov. 19, 1927, pp. 1645–1653, 27 figs. Development of heavy band saws in America, band vs. frame saws; running out and deviating of saw; practical pretreatment of broad blades; theory of stresses in ordinary and pretreated saw blades.

SHEARS

Sheet Material. Capacity of Sheet Shear Increased, P. J. Edmonds. Forging—Stamping—Heat Treating, vol. 13, no. 11, Nov. 1927, p. 443. By addition of mechanical contrivance output of shear is raised to 30 tons daily: sheet steel sheared.

SMOKE

Abatement. The Gas Industry's Contribution to Smoke Abatement, F. W. Goodenough. Gas World, vol. 87, no. 2259, Nov. 19, 1927, pp. 484–488. General conclusion is that while gas industry has already materially reduced industrial smoke there is every prospect of great and early extension of this process through far more widespread use of gas; ultimate aim for great majority of industrial purposes must be elimination of solid fuel altogether. Abstract of paper presented to Public Works, Roads and Transport Congress. See also Gas Jl., vol. 180, no. 3365, Nov. 16, 1927, pp. 465–469.

SPRINGS

Testing. Testing of Vehicle Springs (Prüfung von Fahrzeugfedern), G. Gerber. V.D.I. Zeit., vol. 71, no. 43, Oct. 22, 1927, pp. 1521–1524, 16 figs. Classification of machines for testing with dynamic loading; fatigue tests; specifications for springs of railway cars; design, operation and use of spring-testing machine.

STEAM

Purifiers. Marley Steam Purifier. Power, vol. 66, no. 26, Dec. 27, 1927, p. 1029, 2 figs. It is mounted outside boiler on outlet nozzle from steam drum, where it is easy to install and accessible for inspection; provisions are made to drain internally to boiler or externally to settling drum or steam trap.

STEAM ENGINES

Bleeding. Bleeding Steam Engines (Le soutirage dans le fonctionnement des machines à vapeur), H. Tripier. Chaleur & Industrie, vol. 8, no. 91, Nov. 1927, pp. 625–635, 14 figs. Theoretical foundations of increasing thermodynamic efficiency by single or multiple bleeding.

High-Pressure. The Application of High Pressure to the Reciprocating Marine Steam Engine, S. G. Visker. Shipbldg. & Shipg. Rec., vol. 30, no. 21, Nov. 24, 1927, pp. 583–587, 4 figs. Conversion of machinery of steamer "Borneo" from ordinary triple-expansion installation working with superheated steam of 180-lb. pressure, into high-pressure one of 500 lb.

STEAM PIPES

Risers. Engineers and Contractors Agree on Steam Riser Capacities. Heat. & Vent. Mag., vol. 24, no. 11, Nov. 1927, pp. 61–65 and 87, 6 figs. Critical velocities obtained in research laboratory tests offer basis for figuring capacities of upfeed risers for one- and two-pipe systems.

STEAM POWER PLANTS

High-Pressure. New High-Pressure Power Plant of the Chesapeake Corporation. Paper Industry, vol. 9, no. 8, Nov. 1927, pp. 1323–1331, 6 figs. Productive capacity increased and great savings effected by reconstruction of plant.

STEAM TURBINES

High-Pressure. 12-Lb. Turbine Shows 80 Per Cent Efficiency. Power Plant Eng., vol. 31, no. 22, Nov. 15, 1927, pp. 1186–1188, 3 figs. 7000-kw. unit is 10 per cent more efficient than 300-lb. equipment with which it operates, of which there is installed capacity of 160,000 kw.; turbine improves station economy 3 per cent.

Higher Steam Pressures, and Their Application to the Steam Turbine, A. H. Law and J. P. Chittenden. Engineering, vol. 124, nos. 3226, 3229 and 3230, Nov. 11, Dec. 2 and 9, 1927, pp. 610–613, 728–730 and 763–765, 31 figs. Improvements in power-station efficiency due to higher pressures; high-pressure boilers and turbines; new Klingenberg power station near Berlin; influence of high pressures on turbine design; reliability of high-pressure installations. Paper read before Instn. Elec. Engrs.

Manufacture and Testing. The Manufacture and Testing of Steam Turbines in the Brown-Boveri Works. Mech. World, vol. 82, no. 2132, Nov. 11, 1927, pp. 365–366, 2 figs. Firm has developed a number of special devices and processes of great interest, which have been incorporated in normal manufacturing system; testing and treatment of materials receive special attention; investigations into vibration of disks.

Marine. Installation of Dummy Piston and Cylinder in Main High Pressure Turbine of U.S.S. Leviathan, H. J. Reuse. Am. Soc. Naval Engrs.—Jl., vol. 39, no. 4, Nov. 1927, pp. 624–635, 9 figs. Installation of new piston and cylinder has resulted in more even distribution of load on four shafts and marked increase in fuel economy.

STEEL

Case-Hardening. Automobile Case-Hardening Steel. Engineering, vol. 124, no. 3231, Dec. 16, 1927, p. 796. British Rolling Mills, Brymill Steel Works, have placed on market case-hardening steel, designated CH10; material has long and fine fibrous structure; it is homogeneous, and as free from slag as it is possible to make steel under commercial conditions; material is specially recommended for gudgeon pins and for other automobile-engine parts.

Chromium. See CHROMIUM STEEL.

Decarburization. Surface Decarburization of Carbon Steels (Ueber die Randentkohlung von Kohlenstoffstählen), E. H. Schulz and W. Hülsburch. Stahl u. Eisen, vol. 47, no. 41, Oct. 13, 1927, pp. 1694–1695. Investigation of reactions between steel and surrounding medium in annealing of carbon steels; hammer scaling and other factors influencing decarburization; forms of decarburization and its theory. See also Archiv für des Eisenhüttenwesen, vol. 1, no. 3, Sept. 1927, pp. 225–240, 45 figs.

High Temperatures, Effect of. Properties

of Materials at High Temperatures, H. J. Tapsell and W. J. Clenshaw. Eng. Research—Special Report, no. 2, July 1927, 16 pp., 8 figs. Mechanical properties of 0.51 per cent carbon steel, and 0.53 per cent carbon cast steel. See abstract in Metallurgist (supp. to Engineer), Nov. 25, 1927, pp. 172–174.

Manganese. See MANGANESE STEEL.

Quality of. Quality of Steel, History and Present Status of Problem (Entwicklung und Stand der Qualitätsfrage), P. Oberhoffer. Stahl u. Eisen, vol. 47, no. 37, Sept. 15, 1927, pp. 1512–1526, 14 figs. Historical review from Réaumur to Ledebur; judging quality of steel from chemical analyses, and difficulties involved; oxygen in steel, its determination and significance; application of methods of physical chemistry, results and prospects.

Testing. Notes on the Spark Testing of Steel, G. M. Enos. Am. Soc. Steel Treating—Trans., vol. 12, no. 6, Dec. 1927, pp. 976–981. Sparks given off when ferrous materials are touched to rapidly revolving grinding wheel are characteristic of composition and type of iron or steel in question; author describes technique of making such test and spark characteristics typical of selected group of irons and steels.

STEEL CASTINGS

Cutting. Cutting of Stainless Steel Castings, C. J. Holslag. Welding Engr., vol. 12, no. 10, Oct. 1927, p. 48, 1 fig. In general, as to electric welding, d.c. is best with copper-base rustless alloys and a.c. for chrome and nickel-base alloys. See also Machy (N. Y.), vol. 34, no. 4, Dec. 1927, p. 289.

Foundry Practice. Steel Foundry Practice, A. D. Kirby. Foundry Trade Jl., vol. 37, no. 588, Nov. 24, 1927, pp. 144–146, 1 fig. Deals with sands used; method of molding and manufacture of steel; methods of strickle work.

Manufacture. Steel Making with Special Reference to the Manufacture of Steel Castings, J. Deschamps. Foundry Trade Jl., vol. 37, no. 587, Nov. 17, 1927, pp. 125–127. Describes various processes used at present in steel foundries for production of plain carbon steels and discusses their respective merits and disadvantages. See discussion in Foundry Trade Jl., vol. 37, no. 588, Nov. 24, 1927, pp. 141–142.

STEEL, HEAT TREATMENT OF

Annealing. Annealing of Hardened Steels with Special Reference to Low Temperatures (Zur Frage des Anlassens gehärteten Stahls, unter besonderer Berücksichtigung tieferer Temperaturen), A. Merz and C. Pfannenschmidt. Zeit. für anorganische u. allgemeine Chemie, vol. 167, no. 3–4, Nov. 1, 1927, pp. 241–253, 7 figs. Compilation summarizing work of European, American and Japanese investigations; includes account of experiments on tempering with liquid air. Bibliography.

Castings and Forgings. High Temperature Treatments of Castings and Forgings as Evidenced by Core Drill Tests from Heavy Sections, W. J. Merten. Am. Soc. Steel Treating—Trans., vol. 13, no. 1, Jan. 1928, pp. 1–21 and (discussion) 21–28, 25 figs. Investigations to determine correct thermal treatments for improvement of grain structure of heavy-section steel castings; experimental data show that considerably higher temperature, and extended soaking periods greater than "current ones" are necessary for proper adjustment and alteration of grain structure to permit use of higher service stresses in design of large-size electric machinery; suggestions for heat-treatment practice.

Hardening. Electrifying the Hardening Room. Iron Age, vol. 120, no. 23, Dec. 8, 1927, pp. 1584–1586. 100 per cent electric heat treatment of steel practiced in some plants; economic and other advantages brought out at Yale Conference, New Haven, Conn.; Pratt & Whitney hardening-room equipment; production costs reduced by electricity.

The Water Hardening of Tool Steels, A. Mumper. Forging—Stamping—Heat Treating, vol. 13, no. 11, Nov. 1927, pp. 444–446, 3 figs. Author's experiences in handling steel of various descriptions; suggestions for improving practice.

Tempering. New Theories in Tempering Steel, A. Heller. Am. Mach., vol. 67, nos. 21, 23 and 25, Nov. 24, Dec. 8 and 22, 1927, pp. 797–799, 903–907 and 971–974, 13 figs. Physical properties in steels used in parts are of great importance to machine builder; author explains how some of these properties are developed; Nov. 24: Heating steel for hardening; cause of brittleness; effect of rapid cooling. Dec. 8: Commercial tool steel; changes due to hardening and drawing; warping and bulging causes. Dec. 22: Color method; effect of time variations on color and hardness; control of temperature by fusible alloys; proper drawing temperatures.

STEEL WORKS

Power Generation in. Power Generation in the Steel Industry, G. Fox. Power, vol. 66, no. 22, Nov. 29, 1927, pp. 819–822, 3 figs. Heat balance in American type of steel plant and total by-product heat available to meet demands; electric power system in steel plant can be made effective pool for by-product fuel utilization only if there is sufficient load at all times to absorb power resulting from fuels not feasible of storage, notably from blast-furnace gas.

STOKERS

Doby. The Doby Stoker. Engineering, vol. 124, no. 3231, Dec. 16, 1927, pp. 778–779, 7 figs. Invention of Dutch engineer intended for application to Lancashire boilers, and fitted to boiler of that type at Central Sewage Works at The Hague.

STRUCTURAL STEEL

Durability. The Dangers of Corrosion. Engineering, vol. 124, no. 3231, Dec. 16, 1927, pp. 770–771. Review of paper by F. W. Skinner on "The Unlimited Potential Durability of Structural Steel" read before Brooklyn Engineers' Club. Amply disproves possibility of any danger from corrosion in structures which are designed to comply with present standards and are properly protected, inspected and maintained; paper established beyond doubt suitability of steel for both bridges and buildings.

T

TAPS

Design. Design and Construction of Taps, A. L. Valentine. Machy. (N. Y.), vol. 33, nos. 8, 9, 10, 11, 12, and vol. 34, nos. 1 and 4, Apr., May, June, July, Aug., Sept. and Dec. 1927, pp. 561–565, 648–652, 767–770, 835–839 910–914, 57–61, and 284–286, 23 figs. With special reference to taps having ground threads. See also Machy. (Lond.), vol. 30, nos. 771 and 778, July 21 and Sept. 8, 1927, pp. 489–493 and 705–709, 9 figs.

TEMPERATURE CONTROL

Regulators. Maclaren's Temperature-Control Apparatus. Engineering, vol. 124, no. 3230, Dec. 9, 1927, pp. 746–747, 2 figs. Apparatus which can be used for maintaining constant temperature in gas-heated and electrically heated furnaces and ovens of all descriptions, as well as in buildings, ships' cabins, cold stores, biological incubators, etc.

TERMINALS, LOCOMOTIVE

Maintenance. C. & O. Engine Terminal at Russell, Kentucky. Ry. Mech. Engr., vol. 101, no. 12, Dec. 1927, pp. 799–807. Designed particularly to handle 93 to 104 Mallet locomotives per 24 hrs. with maximum terminal maintenance.

Portsmouth, O. N. & W. Makes Improvements at Portsmouth Terminal. Ry. Elec. Engr., vol. 18, no. 11, Nov. 1927, pp. 369–372. Modern roundhouse employs unique system of induced draft; lighting arrangement gives ample illumination but is economical in operation.

TEXTILE MILLS

Transport System. Selecting a Plant-Transport System, A. H. Church. Indus. Mgmt. (N. Y.), vol. 74, no. 6, Dec. 1927, pp. 368–371. Advantages of runways and ramps, served by tractors with trailers, elevating trucks, etc., in textile plant; system described not only facilitates transport within plant, but "ties in" conveniently with storage of goods, in process or finished.

TIME STUDY

Neglected Values. Neglected Values of Time-Study, J. C. Mottashed. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 691–692. Time study should touch organization at many points; author discusses some neglected points of contact.

Rate Setting. Time Study for Rate Setting, E. C. Van Orsdell. Indus. Mgmt. (N. Y.), vol. 74, no. 6, Dec. 1927, pp. 330–333. Team work by foremen and operatives essential to success.

TRACTORS

Kegresse Chain. Kegresse Chain (Raupenfahrzeuge auf Gummiketten, Der Kegresstrieb), F. Heigl. Motorwagen, vol. 30, no. 18, June 30, 1927, pp. 405–409, 8 figs. Advantages of Kegresse's chain is that it makes possible carrying of heavy loads without ruining road; it is not hampered by stretching; it is silent; it has no joints which are ruined by dirt; it is light and shows low friction losses; it has become accepted means of French Army for transporting large loads over good roads and bad; it has only one serious competitor, the one manufactured by Nybergs Verkstads A. B. in Sweden.

Trailers. Tractor-Trailer Express-Transfer Operation, M. T. Hanrahan. Soc. Automotive Engrs.—Jl., vol. 21, no. 6, Dec. 1927, pp. 678–679. Transport of solid loads of express between various railroad terminals in Chicago by eliminating waiting time of both power plant and chauffeur, fleet of tractors and semi-trailers has proved to be prompt, economical and satisfying for this work.

W

WAGES

Piece Rates vs. Bonus. Piece-Rates or Bonus—Which? Factory, vol. 39, no. 5, Nov. 1927, pp. 803–805. Report of vice-president of manufacturing concern to his board of directors at board's request.

WELDING

Electric. See ELECTRIC WELDING, ARC.

Motor Frames. Welded Steel for Motor Frames, K. F. Rauderbaugh. Iron Age, vol. 120, no. 22, Dec. 1, 1927, pp. 1507–1508 and 1567, 3 figs. History of application to induction motors; findings in costs of material, labor, inventory, toolroom expense and overhead.

Oxyacetylene. See OXYACETYLENE WELDING.

Pipe Fittings. Templets for Welded Pipe Fittings. Domestic Eng. (Chicago), vol. 121, no. 8, Nov. 19, 1927, pp. 18–20 and 72, 10 figs. Brings up question of pipe patterns or templets and gives suggestions; elements of templet construction; development of pipe surface; templet for 45-degree intersection; metal templets.

Pressure Vessels. Welding Pressure Vessels, T. M. Jasper. Welding Engr., vol. 12, no. 11, Nov. 1927, pp. 35–37, 8 figs. Examples of products in service which show dependability of welding and a few tests to show sort of research work back of these products.

Protective Glasses for. Protective Glasses for Gas and Electric Welding, J. W. Forrest. Am. Mach., vol. 67, no. 23, Dec. 8, 1927, pp. 893–894. Recent research has produced glass with ultra-violet absorption to eliminate external effects of short-wave radiation, visible absorption to take away glare and retinal fatigue, and infra-red absorption to prevent retinal or corneal effect; typical specifications for various shades.

Steel Castings. What Are the Justifiable Uses of Welding in Production of Steel Castings? R. A. Bull. Iron Trade Rev., vol. 81, no. 24, Dec. 15, 1927, pp. 1475–1477 and 1488, 4 figs. Deals with policy on welding adopted by group of electric steel foundries.

WIND TUNNELS

Standardization Tests. Standardization Tests in the Wind-Tunnel, E. N. Fales. Soc. Automotive Engrs.—Jl., vol. 21, no. 5, Nov. 1927, pp. 497–507, 15 figs. Points out that two defects in technique of wind-tunnel testing have not yet been overcome; first, aeronautical engineering coefficients derived from tests of small-scale models often require correction for scale effect before they can be applied to full-size design; use of this scale-correction factor has not been standardized; secondly, results obtained from different wind tunnels do not always check, and uncertainty regarding correctness of coefficients may result.

Wall Interference. The Effect of the Walls in Closed Type Wind Tunnels, G. J. Higgens. Nat. Advisory Com. for Aeronautics—Report, no. 275, 1927, 18 pp., 30 figs. Series of tests has been conducted during period 1925–1927 in variable-density wind tunnel on several airfoil models of different sizes and sections to determine effect of tunnel-wall interference and to determine correction which can be applied to reduce error caused thereby; Prandtl theoretical corrections give best results, and their use is recommended for correcting closed wind-tunnel results to conditions of free air; in appendix experimentally determined effect of walls on tunnel velocity very close to their surface is given; this is of special interest because a "scale effect" was found in boundary layer with change in density of tunnel air.

WOODWORKING PLANTS

Chairs. Methods of a Specialized Chair Factory, C. C. Campbell. Wood-Worker, vol. 46, no. 9, Nov. 1927, pp. 30–32, 10 figs. Marble & Shattuck Chair Co., Cleveland, O., was able to increase its production by 25 per cent on 44-hr. week, over what it formerly produced on 60-hr. schedule with only small increase in size of plant.

THE ENGINEERING INDEX

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AERONAUTICS

Air Transport, Future of. The Future of Air Transport, H. F. Guggenheim. Ry. Age, vol. 83, no. 26, Dec. 24 (Section I), 1927, pp. 1251–1253. Factors in air transportation; safety today compared with pre-war times; how life is lost, fog problem, comparative costs, and disadvantages of air transportation; cooperation of railroads needed.

Commercial. Development of Commercial Aviation—A Duty to the National Defense, W. S. Varney. West. Machy. Wld., vol. 18, no. 12, Dec. 1927, pp. 569–570, 2 figs. Brief article dealing with progress of commercial planes; aviation now as business rather than science; night service steadily being increased; American air mail service envy of world; hundreds of small machine parts shipped by air mail and hundreds of orders for machinery dispatched by air mail; air mail service proved reliability of American-built motors and established reliability of airplane as means of transportation.

Progress. Progress in Aeronautics. Mech. Eng., vol. 50, no. 1, Jan. 1928, pp. 48–54, 5 figs. Report contributed by Aeronautic Division of A.S.M.E. Interesting feature has been predominance of air-cooled type of engine; airplane design and construction; aerodynamics; aerial surveying; Department of Commerce, Aeronautics Branch; aeronautical activities of Navy; airships.

Southern United States. What Aeronautics Means to the South and the South to Aeronautics, G. Garner. Mfrs. Rec., vol. 92, no. 25, Dec. 22, 1927, pp. 51–57, 4 figs. Treatment of desirability of opening South to airplane transportation; building of landing fields.

AIR CONDITIONING

Heating Only or. What Will the Engineer Choose—Heating Only or Air Conditioning for the Modern Plant, H. P. Gant. Am. Soc. Heat. and Vent. Engrs.—Jl., vol. 34, no. 1, Jan. 1928, pp. 1–10, 8 figs. Comparison of first cost and operating expense of various types of heating as well as air-conditioning systems for industrial plants; plans shown of actual building in which air-conditioning system is to be installed.

AIR PREHEATERS

Utility. Air Preheaters and Their Utility, C. F. Wade. Colliery Eng., vol. 4, no. 46, Dec. 1927, pp. 494–495. Economies and advantages of air preheaters for combustion and process work; while they cannot compare with exhaust-steam systems of air heating when air is required for manufacturing processes, direct heating of air for such work from sensible heat of waste gases is much more economical than employment of live steam coils; integral type of preheater; as compared with economizers air heaters occupy less space, require no insurance premiums against explosion, and are generally lower in first cost.

Preheated Air for Boiler Furnaces, P. H. N. Ulander. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 274–276, 2 figs. Reviews reasons why air preheater has become apparatus of general importance to modern boiler-house practice, and problems arising from use of preheated air.

AIRCRAFT

Propellers, Design of. Calculating Thrust Distribution and Efficiency of Air Propellers, T. Bienen. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 444, Dec. 1927, 10 pp., 2 figs. Proposes method for preliminary approximate calculations under any operating conditions; determines speed relations and forces developed on section with given direction and velocity of air current, solved with aid of momentum theory; determination of effect of finite number of blades. Translated from Zeit fuer Flugtechnik u. Motorluftschiffahrt, vol. 17, no. 22, Nov. 27, 1927, pp. 485–487, 2 figs.

Radio Direction Finding. Radio Direction Finding, L. A. Hyland. Aviation, vol. 24, no. 1, Jan. 2, 1928, pp. 30–33, 5 figs. Fifth of radio series; aims of radio direction finding to direct aircraft along dark airways, to determine accurately limits of airport and to effect landing regardless of visibility; rotating coil compass not suitable; radio compass valuable on isolated routes; radio beacon; comparison of three types of direction finders; development of beam transmitters; no known remedy for "night effect;" beacon emergency landings possible; airplane direction finding by radio not automatic.

Specifications. Manufacturers' Specifications on American Commercial Airplanes and Seaplanes as Compiled by Aviation. Aviation, vol. 24, no. 1, Jan. 2, 1928, pp. 42–43. Two-page chart showing price, seats, engine, propeller, span, wing area, overall length, overall height, weight empty, pay load, disposable load, normal gross weight loaded, high and cruising speed, landing speed, climb at sea level, climb to 10,000, service ceiling, fuel capacity, range, fuel consumption, fuselage and wing construction, wings wired for lighting, control, brakes, shock absorber, pontoons, certificate granted, performance figures guaranteed.

AIRPLANE ENGINES

Commercial. The German Commercial Aero-Engines, Oefele. Eng. Progress, vol. 9, no. 1, Jan. 1928, pp. 17–21, 7 figs. Achievements of German industry; as regards reliability, price, and economy, German engines compare very favorably with foreign types; advantages of German engines; they excel by exceedingly low fuel consumption and have made considerable progress with regard to increased durability; details of different German makes.

AIRPLANE PROPELLERS

New Type. A New Type of Propeller, F. K. Kirsten. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 77–80, 4 figs. Rotor disk with blades projecting at right angles to disk surface; blades mounted to rotate about own axes, which lie on an orbit concentric with axis of propeller rotor; all blades effective during complete revolution on orbit; efficiency superior to screw type; thrust directed along any line in horizontal plane coincident with rotor surface; noiseless operation; possible applications.

AIRPLANES

Airfoils. The Characteristics of the N.A.C.A. 97, Clark Y, and N.A.C.A.-M6 Airfoils with Particular Reference to the Angle of Attack, G. J. Higgins. Nat. Advisory Committee for Aeronautics—Tech. Note, no. 270, Dec. 1927, 4 pp., 8 figs. Aerodynamic characteristics as determined in variable-density wind tunnel at Langley Field; differences in geometric and absolute angles of attack; drag-coefficient curves and lift curves; polar curves and curves of profile-drag coefficient plotted against lift coefficient; curves of induced-drag coefficient.

Amphibian. The Loening OL-8 Amphibian. Flight, vol. 19, no. 51, Dec. 22, 1927, pp. 861–864, 8 figs. For army and navy observation work and aerial photography; 425-hp. "Wasp" air-cooled radial engine unusually mounted; combination flying-boat and tractor fuselage; hull of wood frame with metal-covering sheets bolted on; specially braced to withstand catapult stress; composite wing construction; aileron fitting and operation; landing wheels pivoted on frames, raised and lowered laterally with respect to hull; dual control provided.

NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Biplanes, Wing Design of. The Distribution of Loads Between the Wings of a Biplane Having Decalage, R. M. Mock. Nat. Advisory Committee for Aeronautics—Tech. Note, no. 269, Nov. 1927, 33 pp., 13 figs. Distribution at various angles of decalage, when gap-chord ratio is one, and there is no stagger; terms defined; vortex theory applied to biplane and corrections necessary in equation due to three effects; theoretical and experimental investigations and comparison; wind-tunnel experiments.

Metal, France. New French Three Engined Metal Plane Is of Interesting Design. Aviation, vol. 23, no. 26, Dec. 26, 1927, p. 1521, 1 fig. Built of Alferium alloy; wing divided in two parts; cantilever structure reinforced by struts; ailerons extending whole length of wing; vertical stabilizer adjustable in flight, horizontal only on ground; three air-cooled 9-cylinder Salmson type 9AB engines; table of dimensions.

Monoplane vs. Biplane. Monoplane or Biplane, C. H. Chatfield. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 49–52 and (discussion) 52–54. Comparison of structural efficiency, aerodynamic characteristics and performance; in structural efficiency biplane superior both in strength-weight ratio and in rigidity; monoplane better adapted to metal construction; biplane advantage in smaller size and affording better vision; advantages of monoplane in aerodynamic characteristics.

Non-Stallable. German Firm Builds Non-Stallable Plane Which Won't "Nose Over." Automotive Industries, vol. 57, no. 26, Dec. 24, 1927, p. 945, 1 fig. Few facts about plane that cannot be stalled and cannot "nose over" on ground; table of weight distribution; description of initial flight.

Seaplanes. See SEAPLANES.

Vought Corsair. The Vought 'Corsair.' Aviation, vol. 23, no. 26, Dec. 26, 1927, pp. 1518–1519, 3 figs. Results of Navy tests; military equipment; interchangeable landing gear.

Welding. Airplane Construction and Welding, R. M. Mock. Acetylene Jl., vol. 29, no. 7, Jan. 1928, pp. 284–289, 7 figs. Discussion of advantages of welded construction and some of important joints in which welding is essential; welding is now practically confined to tubular members, though there is some tendency toward building trusses of pressed sheeting.

AIRSHIPS

Models—Design. Model Airships. Flight, vol. 19, no. 51, Dec. 22, pp. 869–870, 1 fig. Design facts for those anxious to launch forth on problem of model airship construction and flying; rigid, semi-rigid and non-rigid types; Astra Torres type of internal rigging; gas pressure in determining maximum speed; light electric power plant.

ALLOY STEELS

Heat Treatment. Nitralloy and the Nitriding Process, H. A. DeFries. Machy. (N. Y.), vol. 34, no. 5, Jan. 1928, pp. 358–359. Special alloy steels which can be surface-hardened by being subjected to action of ammonia gas for from two to ninety hours, while material is heated to 875 deg. fahr. without subsequent quenching; standard electric furnaces easily adaptable; composition, properties and uses; heat treatment previous to nitriding; nitriding process and equipment; depth and hardness of case.

Production and Uses. The Production and Uses of Ni-Cr-Fe and Co-Cr-Fe Castings, J. F. Kayser. Iron and Steel of Can., vol. 10, no. 12, Dec. 1927, pp. 367–369. Treats of alloys made with Ni, Cr, Fe and Co, and used for high-grade steel as well as stainless or non-corrosive steels; composition of alloys used in United States and England is given.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Copper. See COPPER ALLOYS.

Die Casting. See DIE CASTING.

Lead. See LEAD ALLOYS.

Properties. Alloys for Casting Under Pressure (Les alliages pour la coulée sous pression). Fonderie Moderne, vol. 21, Dec. 10, 1927, pp. 502–503. Alloys with lead, tin, zinc and aluminum bases; gives physical properties, uses of each and advantages for particular cases; maximum weight possible to cast for each alloy.

ALUMINUM ALLOYS

Aluminum-Copper. Segregation of Aluminum-Copper Alloys. Foundry Trade Jl., vol. 37, no. 593, Dec. 29, 1927, p. 224, 1 fig. Review of paper by W. Claus and B. Dango (published in Zeit. fur Metallkunde, no. 9, 1927, p. 358), describing experiments with American alloy containing 8 per cent copper; authors were of opinion that segregation might be responsible for failure in mechanical strength which occurs often with this alloy.

Duralumin. See DURALUMIN.

AMMONIA COMPRESSORS

Design. Developments in the Design of Refrigerating Compressors, O. Henckel. Refrig. Eng., vol. 14, no. 6, Dec. 1927, pp. 186–187, 2 figs. Contribution from chief engineer of Sulzer Brothers, Winterthur, Switzerland; discusses in general terms history which has had its parallel in American practice; deals with valves, bearings and frames, packing, dry and compound compression.

Electric Drive. Driving Two Compressors with One Motor. Power, vol. 67, no. 2, Jan. 10, 1928, pp. 65–66, 1 fig. Discusses plan of connecting two machines to one motor; machines are placed with shafts end to end, in a straight-line pattern, with motor mounted between them; this may be properly termed duplex-coupled arrangement, and is usually called simply "duplex," for short.

AUTOMOBILE ENGINES

Anti-Freeze Solutions. Data on Anti-Freezing Solutions. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, p. 40. Latest information from Bureau of Standards; ready-reference anti-freezing-solution tables based on data in Letter Circular No. 28 of Bureau of Standards and showing percentage by volume, quantity, pints per gallon of water, specific gravity at 60 deg./60 deg. fahr.; table giving practical directions for preparing 1 gal. solution of denatured alcohol, distilled glycerin and ethylene glycol.

Performance. Engine and Car Performance, W. S. James. Soc. Automotive Engineers—Jl., vol. 22, no. 1, Jan. 1928, pp. 96–101 and (discussion) pp. 101–105, 13 figs. Acceleration, hill-climbing ability, fuel consumption and maximum speed considered; size and speed of engine, compression ratio and weight of car; assumptions made and their algebraic expressions; can gain standard performance in various ways; discussion takes up; high compression wanted despite premium fuels; changed torque peak without changing timing; uneven distribution reduces knock tendency; where oil industry is remiss.

Six-Cylinder. The Six-cylinder Engine. Motor Transport, vol. 46, no. 1190, Jan. 2, 1928, pp. 3–6, 9 figs. Problems of design concerned with carburation, ignition and vibration; advantages from operator's standpoint; reviews advantages of 6 cylinders over 4 cylinders and problems and difficulties to overcome to afford these advantages; benefits of higher rotative speed; difficulties of even mixture distribution and air-intake temperature control; methods of mounting on chassis; economy of upkeep.

AUTOMOBILE PLANTS

Cadillac. Cadillac Doubles Plant Output, L. P. Fisher. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 411–414, 4 figs. During past two years company has made far-reaching changes in plant and product involving creation of entirely new car, the LaSalle, and change of Cadillac model; new models were put into production, with increase in annual output of from 22,000 to possible 50,000 to 60,000 cars; more efficient use of production equipment, improved types of machinery, rearrangements of plant layout, and better methods of materials handling have effected increased output with addition of 24% to working force.

AUTOMOBILES

Bodies, Manufacture. The All-Steel Automobile Body as a Manufacturing Problem, J. W. Meadowcroft. Am. Mach., vol. 68, no. 1, Jan. 5, 1928, pp. 9–11, 7 figs. Present-day streamline design and large quantities making necessary use of expensive dies and extensive welding equipment; early history and underlying principles; progressive assembly line as pace setter and problems arising from it; materials selection.

Brussels Exhibition. Austro-Daimler Exhibits Framless Six at Brussels Show, W. F. Bradley. Automotive Industries, vol. 57, no. 26, Dec. 24, 1927, pp. 929–930, 3 figs. Car has three-point suspension chassis; Nagent introduces 4-cylinder double-piston two-stroke supercharged power unit; closed bodies predominate; Ford model A featured.

Design. A New Peugeot Six. Auto-Motor Jl., vol. 32, no. 50, Dec. 15, 1927, pp. 1064–1067, 11 figs. Two-liter-displacement model; fuel economy is feature; interior-drive four-door sedan; six cylinder; monobloc with detachable head and side valves; cylinder bore 65 mm.; oil forced under pressure and cleaned by strainer; air cleaner attached to carburetor inlet; Hartford shock absorbers; wheels wire suspensioned and detachable; pedal applies brakes to all four wheels while hand brake lever applies brakes on rear wheels only; doors mounted on special projecting hinges; cuts showing different features of model.

The Austin Twenty "Six." Auto-Motor Jl., vol. 32, no. 51, Dec. 22, 1927, pp. 1083–1086, 10 figs. Compact engine and transmission unit; eight-bearing crankshaft; 49 hp. at 2000 r.p.m.; 23.5 hp. engine; Ranelagh seven-passenger enclosed limousine or landaulet model; adjustable central transverse window; cylinder bore 79.5 mm.; piston-swept volume of 3400 cc.; hot-spot inlet manifold; automatic pressure-feed lubrication system; oil filter; four-speed gear; four-wheel internal expanding brakes; springs regulated by Smith shock absorbers; ten cuts show different details of model.

Electric. Electrical Equipment of Electric Road Vehicles, L. W. deGrave. Elecn., vol. 99, no. 2584, Dec. 9, 1927, pp. 719–720, 5 figs. Battery versus resistance control; controllers with shunted or parallel fields; permanent series field and shunts of 50 per cent and 10 or 20 per cent best; objections to controllers which interlock with brake; regenerative control; electric brakes; controller contacts and fingers; ampere-hour meters should read level.

Manufacture. Efficient Production with Particular Reference to the Motor-car Industry, H. E. Taylor. Machy. (Lond.), vol. 31, no. 790, Dec. 1, 1927, pp. 265–275, 13 figs. Application of fundamental law governing efficient production and formula; layout of large production factory; machinery and organization; simplicity in manufacturing type of machine tools; vertical station machines; unit continuous system of manufacture; automatic work transference; economy and flexibility of unit system; unit head design; runways and roller tracks vs. mechanical conveyors; comparative output data; multi-tooling. (Paper read before Instn. Production Engrs.)

Steering Equipment. New Device Uses Engine Power to Reduce Steering Effort. Ry. Age, vol. 83, no. 26, Dec. 24, 1927, pp. 1310–1311, 2 figs. Power device to be attached to steering column of motor truck or automobile to assist driver in turning steering wheels easily; device is connected to engine which aids the steersman.

Tires, Improvements in. Another Step in Tire Evolution. Motor Transport, vol. 46, no. 1190, Jan. 2, 1928, pp. 7–8, 3 figs. Startling development in pneumatic-tire construction; how low-pressure tire can be improved and new oval tire with less height and abnormal width affording maximum width of air cushion and tread without changing diameters of wheels or brake drums; tire can be made at less cost and 33 to 40 per cent lighter.

Tires, Simplification of. Tire Making and Size Simplification. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 135–136. Cost reduction through better manufacturing partly offset by cost of needless sizes; brief abstract of paper by B. J. Lemon on Tire Production Progress and Size Simplification; latex coagulated by spraying; recent improvements in tire making; simplification of tire sizes; rim fits can be standardized; discussion following; brief reference to other papers presented to Detroit section.

Wheels, Alignment of. Front-Wheel-Alignment Problems. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 139–140. Brief abstracts of three papers presented at Southern California section meeting by J. E. Van Sant, F. S. Hoover and J. S. Bushey on causes and cures of tire wear and wheel shimmy; methods for correcting misalignment of front-axle parts; improper toe-in or toe-out easily corrected; basis of successful front-wheel alignment.

AUTOMOTIVE FUELS

Knock Characteristics. Comparsion of Methods of Measuring Knock Characteristics of Fuels, G. Edgar. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 41–48, 4 figs. Analysis of data obtained from nine laboratories and methods used; rating of fuels in terms of quantity of tetraethyl lead needed to make fuels equal to standard better than they are; rating of fuels themselves in terms of some other standard fuel to which anti-knock or benzol has been added; discussion of experimental results.

AXLES

Fatigue. Fatigue Cracks in Axles. Metallurgist (Supp. to Engineer), Dec. 30, 1927, pp. 181–183. It is desirable that simple and practical methods of inspection be devised whereby fatigue cracks might be detected at early stage; refers to work of H. F. Moore (Bul. No. 165, Univ. of Ill. Eng. Experiment Station, June 1927), describing series of experiments made on small laboratory specimens to obtain data regarding efficacy of "oil and whiting" method; mentions work carried out at Bureau of Standards in connection with somewhat analogous problem.

B

BEARINGS, BALL

Applications. Applications of Ball Bearings to Machines and Machine Tools. West. Machy. Wld., vol. 18, no. 12, Dec. 1927, pp. 578–582, 9 figs. First of series; adaptability and wide range of application of New Departure ball bearings; all conditions of thrust and radial load provided for, or any combination of two; ball bearings in electric motors and principal advantages; application of ball bearings to electric lighting plant; ball bearings for loose pulleys.

BELTS AND BELTING

Specifications. A. P. I. Belt Specifications and Results of Use, F. O. Prior. Oil Weekly, vol. 48, no. 2, Dec. 30, 1927, pp. 47–50 and 52, 8 figs. Specifications have provided belts better suited for particular needs and code for care has increased term of usefulness; fatigue or endurance tests; belt records; elastic properties of belting.

BLAST FURNACES

Air Drying. Use of Silica Gel for Air Drying in Blast Furnaces (L'emploi du gel de silice pour dessecher le vent des hauts fourneaux), A. Bidault des Chaumes. Génie Civil, vol. 91, no. 27, Dec. 31, 1927, pp. 661–664, 7 figs. Installation at steel works in Scotland of new process of air drying originating in America; results of test since April 1927.

Fuels. The Effect of Varying Ash in the Coke on Blast-Furnace Working, C. S. Gill. Iron and Steel of Can., vol. 10, no. 12, Dec. 1927, pp. 374–376, 2 figs. Gives quantities of ash found in coke used in blast-furnace operation and sulphur in pig iron and analyzes effect of ash on pig obtained, from furnace 55 ft. high, 18 ft. diameter; considered a small furnace.

Operation. Pig Iron Quality Is Affected by Scrap Additions to Blast Furnace, J. L. Jones. Foundry, vol. 56, no. 1, Jan. 1, 1928, pp. 32–34, 4 figs. Specifications for scrap for use in blast furnaces; increasing tendency of large castings to crack and difficulties in machining may be expected as consequence of lack of uniformity of pig iron made by adding scrap to blast furnace; use of forehearths or large mixing ladles, in connection with cupola or electric-furnace melting, should give more uniform product even if heterogeneous material must be charged.

BOILER FEEDWATER

Heating. On Triple Heating of Feed Water of 18,900 Type Locomotive and Sekomoto's Variable Nozzle, G. Sekomoto and K. Tomita. (Japan) Dept. of Railways—Bul., vol. 15, no. 11, Nov. 1927, pp. 1775–1793, 9 figs. See also succeeding article by same authors entitled, Results of Test on Sekomoto's Variable Nozzle of Locomotive, pp. 1794–1800, 4 figs. (In Japanese.)

Regulation. Measurement and Regulation of Feed Water. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 32–33. Measurement of quantity of water is most accurately made by weighing it in tanks where quantity to be measured is not too large and short time determinations are not required; where it is desirable to have continuous observations, some form of meter is advisable; types of meters; feedwater regulators.

Testing. Testing Treated Feedwater. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 30–31, 1 fig. Regular routine tests are made and records kept as guide to operation; titration provides simple method; control of blowdown secured by tests.

Tests of Raw Water Involve Many Processes. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 26–27, 1 fig. Following careful analysis of water, regular routine tests are made by power-plant personnel and records kept; tests should be made for following: Total alkalinity, carbonate, bicarbonate and hydrate alkalinity, hydrogen-ion concentration, chlorides, dissolved oxygen, total solids, suspended solids, turbidity and total hardness.

Treatment. A Method of Feedwater Treatment. Gas Engr., vol. 43, no. 620, Dec. 1927, pp. 323–324. Non-chemical method called "Filtrator" system used at Weston-super-Mare, England; introduces small stream of colloid substances into feedwater or boiler; source of "colloid" is commercial uncrushed linseed; cost very small compared to water-softening plant, and effect as good.

Boiler Water Treatment, V. T. Edquist. Chem. Eng. and Min. Rev., vol. 20, no. 230, Nov. 5, 1927, pp. 43–45, 2 figs. Sons of Gwalia mine in Western Australia is situated about 140 miles north from Kalgoorlie in arid country; water for domestic, boiler and power purposes is pumped from number of shallow outlying wells; when this water is used in boilers in natural state it is scale-forming and intensely corrosive; treatment is by lime-barium, crude witherite being used as source of barium.

Purification and Treatment of Feedwater, S. T. Powell. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 24–26. Present tendencies in methods of testing feedwaters and their subsequent purification and treatment for use in modern power-plant boilers are toward combination of systems; continuous blowdown methods and adoption of zeolite process increasing in use; electrolytic methods have possibilities.

Treat Feedwater for Its Specific Duty. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 27–30 5 figs. It is claimed that treatment methods should be individually determined; factors involved in choice of filter; concentration control; corrosive action reduced by degasification.

Furnace Gases, Stratification of. Effect of Stratification of Furnace Gases on Steam Boiler Losses, F. M. Marquis, P. Bucher and H. M. Faust. Ohio State Univ. Studies—Bul., no. 34, Nov. 1927, 82 pp., 44 figs. Investigation of combustion conditions and of interrelations of boiler losses in boilers located in Ohio State University Power Plant; description of boiler units on which tests were run; method of conducting tests; program of tests, and discussion of some of more important results, together with their graphical presentation.

Furnace Tubes. Designing Furnace Tubes for Horizontal Internally Fired Land Boilers. Boiler Maker, vol. 22, no. 12, Dec. 1927, pp. 354–355, 16 figs. Defects caused by expansion and contraction of furnace tubes of internally fired boilers have brought about many changes in design of these tubes, which are discussed; modifications of Adamson furnace; cone-shaped furnace rings.

Furnaces—Operation. Continuous Combustion at High Pressures, E. C. Wadlow. Engineer, vol. 144, no. 3754, Dec. 23, 1927, pp. 704–705, 5 figs. Description of experimental furnace which writer constructed to supply quantity of gas at elevated temperatures and pressures; experiments show that satisfactory continuous combustion can be maintained in chamber of small capacity; heat looses are considerable; statements are based upon experience gained during about 150 hours running with combustion taking place.

Locomotive. See LOCOMOTIVE BOILERS.

Rating. Is Boiler Rating an Engineering or a Trade Problem? Heat. and Vent. Mag., vol. 25, no. 1, Jan. 1928, pp. 89–90. Analysis of boiler-rating code problem by well-known consulting engineer approaches subject from new point and suggests that, after all, matter is industrial rather than engineering.

BOILERS

Control. Modern Boiler Room Control, J. M. Drabelle. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 34–35. Automatic control as applied in modern plants; it is function of automatic boiler-control equipment to duplicate as closely as possible results obtained under test conditions.

Design. Modern Boilers, Their Design and Construction—Methods of Increasing Power Plant Efficiency, E. R. Fish. Steam Coal Buyer, vol. 8, no. 5, Nov. 1927, pp. 38–41. How boilers are made to stand present high pressures; great demand for new boilers of large sizes; water walls are necessary; chimney losses are reduced; superheaters used, necessary to select right equipment for case at hand.

BOLT-MAKING MACHINES

Landis. Bolts Formed and Threaded Rapidly. Iron Age, vol. 120, no. 26, Dec. 29, 1927, pp. 1786–1787, 3 figs. Bolts are cut to length and have ends formed and threaded on high production basis on automatic forming and threading machine marketed by Landis Machine Co.; new features are incorporated to assure full thread at start, accurate lead, and minimum amount of taper.

Landis Automatic Bolt Forming and Threading Machine. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1029–1030, 3 figs. Constant-time element for withdrawal of forming and threading heads, and indexing of turret chuck. Capacity for bolts $^5/_{16}$ to $^3/_4$ in. in diameter, 1 to 6 in. long under head and with $2^1/_2$-in. length thread; oscillation of grip jaws about pivot parallel to bolt; threading head speed controlled by change gears; automatic safety devices; delivery of finished bolts and chips to separate compartments.

BONUS SYSTEMS

Boiler Operation. Operating Boiler Plant on a Bonus System, A. M. Miller. Power, vol. 67, no. 2, Jan. 10, 1928, pp. 55–58, 5 figs. Favorable results obtained with hand-fired horizontal return-tubular boilers at Tennessee plant of Eastman Kodak Co.; inasmuch as result depends largely upon human equation, company decided to experiment with bonus system for firemen.

Parkhurst Differential. Parkhurst Differential Bonus Plan, F. A. Parkhurst. Mfg. Industries, vol. 13, no. 6, Dec. 1927, pp. 429–434. Method of calculating differential bonus pay as applied to wages payroll group of employees; flexibility of differential bonus plan described is such that very much larger percentage of all employees' time can be standardized and resultant department, division and plant efficiencies accurately determined in way which is practically impossible under any other, method of control. (To be continued.)

BRASS FOUNDRIES

Metallurgical Control. Brass Foundry Tests Every Heat, E. Bremer. Foundry, vol. 56, no. 1, Jan. 1, 1928, pp. 2–6 and 14, 6 figs. Modern brass foundry that maintains most complete metallurgical and chemical department according to present day standards is Mueller Brass Co., Port Huron, Mich.; details of labor-saving devices and methods employed.

BRONZE FOUNDING

Progress in. Developments in Engineering Bronze Founding. Metal Industry (Lond.), vol. 31, no. 22, Dec. 2, 1927, pp. 511–512. Progress in bronze castings; tilting furnaces; electric furnace for foundry work; gas absorption in bronze; grain size and strength; worm-wheel blanks; tin and tin substitutes. Paper read before joint meetings of Inst. of Metals & Inst. and Brit. Foundrymen. See also Foundry Trade Jl., vol. 37, no. 591, Dec. 15, 1927, pp. 195–198, 2 figs.

C

CABLEWAYS

Equipment. Rocker Cableways Dumping Over a Wide Area (Die Pendelseilbahn als flaechenbestreichendes Foerdermittel), G. W. Heinold. V.D.I. Zeit., vol. 71, no. 50, Dec. 10, 1927, pp. 1751–1755, 9 figs. General layout and details of mechanical and electrical equipment of cableway, at Stinnes mine near Essen, used for filling and raising wide area.

CARBON DIOXIDE COMPRESSORS

Development. The Progressive Development of Carbon Dioxide Refrigerating Methods, J. C. Goosmann. Refrig. Eng., vol. 14, no. 6, Dec. 1927, pp. 188–189. History of development of CO_2 machines; nearly all of European CO_2 compressors are designed along standard lines, either horizontal or vertical, single or double acting; condensers, valves and other auxiliary parts show very little deviation from conventional forms; there are two distinct types of fully enclosed crankcase machines, distinguished as "step-piston" and "straight-piston" type; advantages and disadvantages of each.

CARBURETORS

Air Cleaners. Air-Cleaner Mountings. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, p. 107, 1 fig. Series of carburetor air-horn dimensions developed for air-cleaner mountings; table including sizes of carburetor larger and smaller than those used at present for attachment of air cleaners.

Flange Standards. New Duplex-Carbureter Flanges. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, p. 106, 1 fig. Dimensional specifications for five standard sizes developed by subdivision; four-bolt mounting; two center holes optional; distance between centers of center holes increased by $^1/_8$ in.; some holes have been moved $^1/_{16}$ in. away from barrel for wrench clearance; spacing between barrels increased in $1^1/_4$-in. size.

CARS

Axle Boxes. New Type of Axle-Box for Railway Rolling-Stock. Ry. Engr., vol. 49, no. 576, Jan. 1928, pp. 24–25, 7 figs. Principle involved is that of centrifugal and automatic lubrication, and type of axle box mentioned is being largely adopted on Continental railways, viz., in France, Germany, Belgium and Spain; in America, Pennsylvania Railroad is also experimenting with it; in Isothermos axle box everything in nature of lubricating pads or packing is dispensed with; axle box is made of steel or cast iron.

Electric-Railway. Articulated Cars Meet Unusual Requirements, W. J. Clardy. Elec.

Ry. Jl., vol. 71, no. 1, Jan. 7, 1928, pp. 17–20, 6 figs. This type of car is suitable for heavy loads on subway and surface lines, but is not flexible where small units are needed at certain periods; describes articulated cars used by street-railway companies in various cities of United States; compares articulated and coupled cars and service suitable for each.

Light Weight Features Joliet Car, J. R. Blackhall. Elec. Ry. Jl., vol. 70, no. 25, Dec. 17, 1927, pp. 1103–1106, 5 figs. New cars for Chicago and Joliet electric railway; special mechanical features and body construction of aluminum.

CARS, PASSENGER

Steel. New Steel Coaches, Northern Railway of France. Ry. Gaz., vol. 47, no. 26, Dec. 23, 1927, pp. 788–791, 11 figs. Construction of new type of corridor coaches; tubular construction used to reduce weight and increase strength; alpax metal used on account of its lightness.

Metal Cars with Trucks, for Interchange (Voitures métalliques à bogies et à intercirculation), J. Vallancien. Revue Générale des Chemins de Fer, vol. 46, no. 12, Dec. 1927, pp. 38–570, 5 figs. Studied by central office of railway material research; describes cars for first, second and third-class passengers, giving particulars of their construction and operation on French railways.

CARS, TANK

Glass-Lined. Conveyance of Milk in Glass-Lined Tank Wagons. Ry. Gaz., vol. 47, no. 24, Dec. 9, 1927, pp. 723–727, 9 figs. Design of vehicles for this traffic; cooperation between United Dairies Ltd. and Great Western and L.M.S. Railways; collecting and filling plants; economics of bulk transport of milk; hygienic advantages.

CASE-HARDENING

Diffusion. Case-Hardening of Metals by Diffusion. Diffusion of Tungsten in Iron (Die Oberflaechenveredelung der Metalle durch Diffusion. Die Diffusion von Wolfram in Eisen und die Resistenzgrenzen der Eisen—Wolframlegierungen), G. Grube and K. Schneider. Zeit. fuer anorganische u. allgemeine Chemie, vol. 168, no. 1, Nov. 21, 1927, pp. 17–30, 4 figs. Results of experimental research, done in laboratory of physical chemistry of Stuttgart Institute of Technology; describes heat treatment of iron in hydrogen medium in presence of tungsten; calculation of diffusion coefficient; determination of limits of chemical resistance.

Principles. Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. for Steel Treat.—Trans., vol. 13, no. 1, Jan. 1928, pp. 142–154. Explains what case-hardening is, reviews history; reasons for case-hardening; selection of steels; S.A.E specifications for plain carbon case-hardening steels; presents table giving chemical composition of alloy steels commonly used for case-hardening.

CAST IRON

Fatigue. Fatigue of Cast Iron, C. H. Bulleid and A. R. Almond. Engineering, vol. 124, no. 3232, Dec. 23, 1927, p. 827, 6 figs. Data on an iron suitable for light castings and typical cylinder iron; from results of these two irons and those obtained previously, it appears that ratio of fatigue stress to transverse stress varies greatly in different irons, and may be very low.

Machinability. Effects of Nickel on the Machinability of Cast Iron. West. Machy. Wld., vol. 18, no. 12, Dec. 1927, pp. 591–592, 2 figs. Brief article with purpose of examining difficulties encountered in machining gray cast iron, and by means of metallurgical laws, microscope and chemical analysis pointing out causes; effect of combined carbon; hard spots and remedy; high silicon content and slow cooling promote internal shrinks; nickel in gray iron supplements silicon without inducing internal shrinking; nickel makes pre-annealing unnecessary.

Mechanical Properties. Some Mechanical Properties of Cast Iron. Metallurgist (Supp. to Engineer), Dec. 30, 1927, p. 188. Review of report by Moore, Lyon and Inglis (Bul. No. 164, Univ. of Ill. Eng. Experiment Station); material was drawn from following sources: 6-in. pipe cast by centrifugal process; hollow cylinders cast in green-sand molds with dry-sand cores; and inner wall of double-walled cylinder casting.

Maurer Diagram. The Influence of Cooling Rate on Maurer Diagram for Cast Iron. Foundry Trade Jl., vol. 37, no. 593, Dec. 29, 1927, pp. 222–224, 4 figs. Maurer diagram demonstrates relationship between structure of cast iron and silicon and total-carbon contents at ordinary cooling rate; results of experiments made by E. Maurer and P. Holtzhausen (see Stahl u. Eisen, nos. 43 and 47, 1927, pp. 1805 and 1977) showing how lines of diagram are modified by adopting various cooling rates.

Properties. Hardness and Machinability of Cast Iron, W. Melle. Foundry Trade Jl., vol. 37, no. 591, Dec. 15, 1927, p. 201, 3 figs. Investigations to find out relationship between these two mechanical properties; experiments were made with various kinds of cast irons, Brinell hardnesses of which were within range from 90 to 240 kg. per sq. mm., and show that it is quite possible to examine machinability of cast iron by Brinell test, but relationship between these two properties is not linear one. Translated from Giesserei-Zeitung, 1927, no. 17, pp. 485–486.

Superheating. Theory of Superheating Cast Iron. Foundry Trade Jl., vol. 37, Dec. 29, 1927, no. 593, p. 234, 2 figs. Critical discussion of paper by Hannemann (Stahl u. Eisen, no. 17, 1927, p. 693), in which he refers to experimental results obtained by Piwowarsky; reviewer maintains that quenching of samples at temperature close to eutectic temperature without reference to commencement of graphitization leaves insufficient facts for considering possibility of influence within this region; in confirmatory experiments it is highly desirable that they be conducted under freely cooling conditions down to temperatures below pearlite point.

CASTINGS

Design. Some Faults in the Design of Castings, W. J. May. Mech. Wld., vol. 82, no. 2137, Dec. 16, 1927, pp. 447–448, 7 figs. Suggestions for castings made with cast-on flanges and other projections; castings in which ribs are introduced for purposes of stiffening and adding extra strength; designing of machines having parts awkward to mold or cast; question of suitability of metal for particular purposes.

CHAIN DRIVE

Limitations. Limitations of Silent Chain Drives, A. B. Wray. Indus. Engr., vol. 85, no. 12, Dec. 1927, pp. 589–591, 4 figs. Maximum horsepower using chain drive; ratios of sprockets in train, proper center distances, number of teeth in sprockets; installation economies in chain-drive gearing shown by examples.

CHROMIUM PLATING

Anodes for. Anodes for Chromium Plating, O. P. Watts. Metal Industry (Lond.), vol. 31, no. 24, Dec. 16, 1927, pp. 563–565. Tests of effect of anode materials upon solution and upon deposit; anodes used were chromium, lead, iron and steel, nickel and iron silicon, iron-chromium, nickel-chromium, nickel-silicon and nickel-chromium-silicon alloys. Paper read at Am. Electrochem. Soc.

Corrosion Prevention. Chromium as a Corrosion Preventative, L. Wright. Metal Industry (Lond.), vol. 31, no. 25, Dec. 23, 1927, pp. 577–579, 16 figs. Early hopes for production of permanent corrosion-resistant coating of chromium have been hardly realized; failure of carefully stored chromium-plated brass articles in about fortnight, forced author to conclusion that many factors, other than corrosion, were at work in causing breakdown of chromium; it has become apparent that failure is not haphazard; discusses number of definite types of failure and attributes to each article definite cause for its breakdown.

CHUCKS

Hydraulic. Gridley Hydraulic Unit to Operate Chucks. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1033–1034, 2 figs. To operate chucks of screw machines, chucking machines, automatic lathes and other production machinery hitherto actuated pneumatically; consists of tank to hold quantity of oil, cover with motor-driven pump, accumulator for building up air pressure, gages to indicate pressure and valves to regulate oil flow.

Pneumatic. Air Chucks and Fixtures. Machy. (Lond.), vol. 31, nos. 791 and 793, Dec. 8 and 22, 1927, pp. 289–291 and 381–384, 12 figs. Pneumatically operated equipment designed to save time and labor in quantity production; air-operated clamping unit, incorporated in various types of work-holding fixtures and jigs; chucks with pressure-equalizing mechanisms; expanding mandrels used in gripping both ends of long housings during lathe operation; fixture for vertical machine; simple drill jig; line cuts showing details of devices.

COAL

Low-Temperature Carbonization. The "K. S. G." Process of Low Temperature Carbonization, D. Brownlie. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 282–288, 2 figs. Account of "Kohlenscheidungs-Gesellschaft" process which has been in operation on commercial scale since 1924 at Matthias-Stinnes coal mine near Essen, Germany; process is specially intended for production of hard, smokeless, free-burning fuel in comparatively large pieces direct from bituminous coal dust and smalls.

Pulverized. See PULVERIZED COAL.

COMBUSTION

Control. Combustion Control Formulas, E. A. Uehling. Power, vol. 67, no. 1, Jan. 3, 1928, pp. 12–14, 2 figs. Application of formulas to test data; heat-loss formulas; it is evident that per cent of CO_2 and CO, temperature of gas on leaving boiler, and square root of boiler draft are fundamental data required for intelligent and effective control of boiler operation.

COMPARATORS

Hilger. The Hilger "Tenthou" Comparator, C. F. Smith. Machy. (Lond.), vol. 31, no. 790, Dec. 1, 1927, p. 263, 2 figs. Brief account of optical gage or comparator which measures differences to accuracy of 0.0001 in. (0.00254 mm.); designed to measure depressions in rubber; projects bright line on white scale 10 in. in length, divisions of which measure 0.05 in.; total difference of 0.02 in. measured directly to 0.0001 in., and by estimation to 0.00005 in.; small constant pressure applied to object by contact point; only one moving part.

CONDENSERS, STEAM

Air and Steam Measurements. Air and Steam Measurements Most Difficult. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 59–62, 10 figs. Instruments showing air and steam conditions in condenser moisture in steam cannot be measured; various methods of measuring air discharged are used, most accurate being bell or gasometer.

Design. Condenser Design and Construction Progress, G. A. Orrok. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 55–56, 2 figs. Decreased surface and high heat transfer are results of improved design of condensers and auxiliaries; water-side problems remain to be solved.

Problems of. Condensate Handling Presents Many Problems. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 62–64, 6 figs. With surface condensers return of condensed steam to boiler-feed system offers many possibilities which should all be analyzed; one method of measurement which offers no possibility of argument is direct measurement of weight with calibrated scales.

Water Supply for. Circulating Water Supply Extremely Important. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 64–66, 7 figs. If natural supply is not available spray pond must be provided entailing additional investment and auxiliary power; quantity of circulating water can be found from heat balance.

Water Testers. New Pattern Portable "Dionic" Water Tester. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, p. 292, 1 fig. Consists of two parts, water-tube section and conductivity meter; it can be mounted permanently on panel, placed on bench, or suspended in vat or tank; used for determining leakage in condensers.

CONTAINERS

Freight, Theory of Use. The General Theory of Container Use, B. Allen. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 74–76. Unit containers for transportation of freight by rail and highway; container operation in United States; full benefit dependent on general use; benefits to railroads; advantages to be gained by shippers; two container sizes seem logical; requirements to be met in design; field for container use.

CONVEYORS

Chain. Carrying Engines on 1½-Mile Conveyor. Iron Age, vol. 120, no. 26, Dec. 29, 1927, p. 1784, 1 fig. Chain-type conveyor said to be longest installed in any industrial plant, is being used by Buick Motor Co., Flint, Mich., for taking engines from test room to car-assembly plant.

Roller Bearings in. Roller Bearings in Conveyors, M. Weckstein. Indus. Engr., vol. 85, no. 12, Dec. 1927, pp. 575–577 and 591, 12 figs. Application of anti-friction bearings to conveyor rolls and drive mechanism; this covers horizontal and inclined rollers for belt conveyors and conveyor wheels; analyzes loads and oiling methods for roller bearings only.

COPPER ALLOYS

Properties. Copper-Silicon Alloys of High Copper Content (Zur Kenntnis der Kupfer-Siliciumlegierungen mit grossem Kupfergehalt), W. Geiss and J. A. M. van Liempt. Zeit. fuer anorganische u. Allgemeine Chemie, vol. 168, no. 1, Nov. 21, 1927, pp. 31–32. Experimental study of mechanical, electrical and chemical

properties of copper-silicon alloys containing not more than 6% silicon, particularly resistance to corrosion.

CORES

Machines for Making. Makes Changes in Design of Core Machine. Foundry, vol. 56, no. 1, Jan. 1, 1928, p. 41, 1 fig. American Foundry Equipment Co., Mishawaka, Ind., has made number of changes in its extrusion-type core machine; new machine is equipped with force-feed rod and mixer to insure uniform sand for all sizes of cores.

COST ACCOUNTING

Errors in. Cost Revelations in Two Products Plants, E. E. Sheasgreen. Concrete Products, vol. 33, no. 6, Dec. 1927, pp. 35–37. Reveals how easy it is for small or large business concern of any kind to make same identical fundamental business errors because of wrong thinking of executives; answers given by two executives, one of large plant and one of small, to survey-analysis form; both are dissatisfied with their progress. Author shows what is wrong in both cases.

Seasonal Problem in. The Seasonal Problem in Cost Accounting, A. Sangster. Ry. Age, vol. 83, no. 27, pp. 1331–1333. Automobile industry is outstanding example of seasonal problem; railroads, electric power and light, telephone, also receive some attention on peak-load requirements; accounting must show variations in demand as well as average costs.

COST CONTROL

Basic Data for. Basic Data for Setting Standard Costs, H. J. Bock. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 419–423. Describes fully what information is needed before complete and scientific standard cost plan can be installed and operated successfully; developing uniform records and establishing systematic procedure; data for manufacturing costs; presents diagram showing prerequisites of standard cost and successive steps in logical order for collecting and compiling of data for these costs from current records.

CRANES

Electric Traveling. Some Modern Types of Steel Mill Cranes, W. D. Keller. Iron and Steel Engr., vol. 4, no. 12, Dec. 1927, pp. 506–508. Describes features of overhead traveling cranes; 4-girder type used for ladles; one-piece trolley and use of worm gears advocated; anti-friction bearings used and interlocked gear type of trolley.

Jib. Dock Cranes with Inclinable Overhang (Grue de quai, a volée inclinable). Bul. Technique de la Suisse Romande, vol. 53, no. 26, Dec. 31, 1927, p. 317, 1 fig. Jib crane mounted on movable frame rolling on track; overhand of jib variable, load at maximum overhang of 20 m. is 3 tons; minimum overhang, 8 m. movements of crane are all by electric motors.

CUPOLAS

Control. Control of Cupolas (Controle des cubilots), H. Carra and R. Fric. Chaleur and Industrie, vol. 8, no. 92, Dec. 1927, pp. 673–678, 2 figs. Discusses heat radiation, specific heat of gases, measurement of gas pressure, analysis of gas, CO and CO_2 and amount of air necessary for combustion; relation between real and calculated percentages of CO and CO_2.

D

DIE CASTING

Alloys for. Die-Casting Alloys. Machy. (Lond.), vol. 31, no. 793, Dec. 22, 1927, pp. 397–398. Alloys can be conveniently divided into three groups, namely, those of low melting point, which include tin-base, lead-base, and zinc-base alloys; aluminum-base alloys; and copper-base alloys, which include 60/40 brass, aluminum bronze, high-tensile brass, and aluminum-brass, each of which is discussed.

DIES

Cutting, Design of. Multiple-prong Shearing Die, F. Server. Machy. (N. Y.), vol. 34, no. 5, Jan. 1928, pp. 388–389, 2 figs. Shears ends on three prongs which are made as integral part of flat plate; combined hand-clamp and sub-press arrangement; unit attached to ram operates die-shearing members secured to die bed; clamping work in position; operating die; two-line cuts give details of die.

Punching. Die for Producing Hunting Tooth Gear. Machy. (Lond.), vol. 31, no. 793, Dec. 22, 1927, p. 390, 2 figs. Punch and die employed in production of two-tooth hunting gears commonly used in mechanical accounting devices; die is of progressive type, having three positions.

DIESEL ENGINES

Double-Acting. New German Double Acting Diesel Engine. Mar. Eng. and Shipg. Age, vol. 33, no. 1, Jan. 1928, pp. 36–38, 3 figs. Four-cycle engines abandoned in favor of two-stroke type; new design to be installed in Hamburg American cargo ships; A.E.G. of Germany, makers of B. & M. 4-cycle Diesel, unable to compete with German-made 2-cycle, A.E.G.-Hesselman double-acting 2-stroke engine which this paper describes; 1000 b.hp. at 120 r.p.m.

Exhaust Temperatures. Exhaust Temperatures and Limiting Capacities of Diesel Engines with Non-Cooled Cast-Iron Plunger Pistons (Auspufftemperaturen und Leistungsgrenzen von Dieselmaschinen mit ungekuehlten Grauguss-Tauchkolben), V. Heidelberg. V.D.I. Zeit., vol. 71, no. 52, Dec. 24, 1927, pp. 1800–1804, 10 figs. Relation between exhaust temperature, capacity and number of revolutions as aid to quick determination of load distribution in cylinders and maximum permissible power output under any conditions; maximum output of two-stroke engines depending on back pressure.

Ignition. Diesel Engine Ignition Lag Largely Influenced by Preheating, P. M. Heldt. Automotive Industries, vol. 57, no. 26, Dec. 24, 1927, pp. 936–938, 5 figs. Density of air also factor; development of high-speed ignition-compression engine for automotive service in Europe; several new models.

Lubrication. Lubricating Power Cylinders of Diesel Engines, W. C. Northcutt. Eng. World, vol. 32, no. 1, Jan. 1928, pp. 26–29. Purpose of this paper is to offer constructive criticism of present methods of applying lubricating oil to power cylinders of Diesel engines, and to recommend method which is believed to be improvement; discussion, data and conclusions based on experimental study of this phase of Diesel-engine lubrication.

Present Status. The Present Status of the Diesel Engine (L'état actuel des moteurs Diesel), F. Annay. Vie Technique et Industrielle, vol. 9, no. 99, Dec. 1927, pp. 133–139, 7 figs. Principle of Diesel engine reviewed and compared with explosion engines, and other prime movers; advantages of Diesel lie in simplicity of installation and freedom in choice of arrangement; semi-Diesel and super-Diesel described and characteristics of some Diesel engines and semi-Diesels.

S.L.M. S.L.M. Diesel Engines with Turbo-Blower for Supercharging (Moteurs Diesel S.L.M. avec turbo-soufflante de suralimentation), A. Duchi. Bul. Technique de la Suisse Romande, vol. 53, no. 26, Dec. 31, 1927, pp. 310–314, 6 figs. General description of new engine made by Swiss Co. for engines and locomotives at Winterthur; system employed, fuel consumption, dimensions, weight, price; possibilities of supercharging.

DIVIDING MACHINES

Swiss. Société Génévoise High-Speed Drum Dividing Machine. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1037–1038, 1 fig. Primarily for speed rather than high accuracy; for graduating micrometer drums for lathes, milling machines, or testing machines; tracelet permanently mounted in horizontal position with provision for tilting work holder through 90 deg.

DRILLS, TWIST

Grinding. Remarks on Grinding of Twist Drills, W. M. Gladding. Abrasive Industry, vol. 9, no. 1, Jan. 1928, p. 3. Brief account of important features in drill-point grinding; tables of drill clearance angles and of point-pressure and torque data; standard drill angles; disadvantages in too much or insufficient lip clearance.

DRY KILNS

Steam-Jet-Blower. Design of Lumber Dry Kilns, H. L. Alt. Heat and Vent. Mag., vol. 25, no. 1, Jan. 1928, pp. 101–102, 2 figs. Describes new type of steam-jet-blower dry kiln with chart showing air and moisture conditions during ordinary lumber-drying process.

DURALUMIN

Properties. "Duralumin," L. Aitchison. Metal Industry (Lond.), vol. 31, no. 26, Dec. 30, 1927, p. 602. Discusses its properties and heat treatment; it is produced and used in all known forged forms; it is most conspicuous non-ferrous material which has to be completely heat-treated, that is, hardened by quenching and tempered; it is subject to corrosion to certain extent, but is less corrosive than steel. Lecture given before Coordinated Societies in Birmingham, England.

E

ECONOMIZERS

Corrosion. Internal Corrosion of Fuel Economizers, E. Ingham. Mech. Wld., vol. 82, no. 2138, Dec. 23, 1927, p. 467. Corrosion caused by pure water is generally believed to be due to presence in water of dissolved gases, oxygen, or carbonic acid; corrosion may be avoided by using pure water entirely free from dissolved gases; a great deal may be done to prevent corrosion due to presence of dissolved gases in feedwater by introducing with feed certain reagents; remarks are confined to ordinary cast-iron economizer.

ELECTRIC FURNACES

Foundry. Fiat Electric Furnaces in Steel Foundries (Der Fiat-Ofen in der Stahlformgiesserei), E. Widdel. V.D.I. Zeit., vol. 71, no. 51, Dec. 17, 1927, pp. 1785–1789, 11 figs. Description of Fiat furnaces manufactured by Demag and A.E.G.; principle of operation of electric installation; system of wiring; transportation of scrap; performance data and economy.

High-Frequency. Crucible Steel Production in a High-frequency Electric Steel Furnace. Ry. Engr., vol. 49, no. 576, Jan. 1928, pp. 10–15, 6 figs. Ajax-Northrup high-frequency electric steel furnace effects revolution in production of tool steel by increasing capacity of crucible from 60 to 450 lb., and reducing time of melting from 4 hours to 1 hour, while also affording better control.

Demonstration of the Ajax-Northrup High-Frequency Electric Furnace. Foundry Trade Jl., vol. 37, no. 591, Dec. 15, 1927, p. 194, 1 fig. Motor-generator type built by Electric Furnace Co., London, is of crucible type of 400 lb. capacity, in which metal is melted by high-frequency current, conducted to water-cooled coil surrounding crucible; by this means all advantages of old crucible process are retained while no deleterious gases are introduced and cost is greatly reduced.

Electric Crucible Steel. Machy. (Lond.), vol. 31, no. 792, Dec. 15, 1927, p. 375, 2 figs. Inauguration of new system in Sheffield; installation of Ajax-Northrup high-frequency furnace operating on principles of ironless induction and generation of heat by eddy currents.

High-Frequency Induction Melting, D. F. Campbell. Iron and Steel of Can., vol. 10, no. 12, Dec. 1927, pp. 363–366, 5 figs. Describes high-frequency furnace used in Sheffield Steel Works for melting lots of 400 to 500 lb. of steel; 18 per cent tungsten steel in 300-lb. lots can be melted in 45 min.; very low-carbon alloys can easily be made; 150-kva. generator used.

High Frequency Induction Melting. Colliery Guardian, vol. 135, no. 3493, Dec. 9, 1927, pp. 1432–1433, 1 fig. Recent development of high-frequency melting is motor-generator type of Ajax-Northrup furnace; demonstration plant at Bilston has been used for melting steel, brass, copper, pure nickel, nickel-silver, aluminum and other metals and alloys.

Miguet. The New Miguet Electric Furnace with Continuous Electrode (Le nouveau four électrique Miguet à électrode continue), R. Sevin. Jl. du Four Electrique, vol. 36, no. 16, Nov. 15, 1927, pp. 245–247, 5 figs. Description of Miguet furnace installed at Montricher; method of operating it; advantages of this type of furnace in metallurgy and economy in its use.

ELECTRIC LOCOMOTIVES

Switching. Switching Locomotives, Type Ee 2/2 of the Swiss Federal Railways (Les locomotives de manoeuvre, type Ee 2/2 des Chemins de fer fédéraux suisses), A. E. Muller. Bul. Technique de la Suisse Romande, vol. 53, no. 25, Dec. 17, 1927, pp. 298–302, 10 figs. Describes switching locomotive recently put in service at Sion, Switzerland; built at Geneva by Secheron Ships; weight, 25½ tons; traction effort at starting, 6000 kg.; control board, transformers, trucks and motors treated.

ELECTRIC WELDING MACHINES

Arc. Motor Driven Arc Welder. Boiler Maker, vol. 22, no. 12, Dec. 1927, p. 338, 1 fig. Most recent addition to Fuzon line of arc welders is d.c. machine operated by 3-phase, a.c. motor, either 220 or 440 volts supply.

Single-Operator Type. General Electric Single-Operator Type Welder. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1039–1040, 1 fig. Machine includes four-bearing, ball-bearing motor-generator set with flexible coupling; generator rated at 300 amperes, one hour, 50 deg. cent., and driving motor at 15 hp., 40 deg. cent., continuous rating; field control unnecessary; meters have metal front except for glass over scale; for stationary or portable use.

ELEVATORS

Chain. Chain Elevators, E. J. Tournier. Indus. Engr., vol. 85, no. 12, Dec. 1927, pp. 558–560, 6 figs. Description of chain elevators at U. S. Pipe & Foundry Co., Burlington, N. J., used to raise barrels; also outfit used in warehouse in Eastern, N. Y., 5 stories high, 150 by 300 ft.; tray elevator used.

Relays. Sequence Relay on Elevator Prevents Fuses Blowing, O. F. Dubruiel. Power, vol. 67, no. 1, Jan. 3, 1928, pp. 29–31, 3 figs. To overcome troubles experienced, author made sequence and relay and connected it into potential-switch coil circuit; controller cannot function except when landing doors are closed before controller is pulled to "on" position.

EMPLOYMENT MANAGEMENT

Contract of Employment. The Contract of Employment, A. H. Rodrick. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 999–1002. Obligations of employer and employee in regard to discharge, promise of extra payment, and working subsequently for competitor; some court cases as examples.

ENGINEERING EDUCATION

Policies and Practices. Opinions of Professional Engineers Concerning Educational Policies and Practices. Jl. of Eng. Education, vol. 18, no. 4, Dec. 1927, pp. 215–275, 24 figs. Summary of inquiries by A.S.C.E. and A.I.M.E., A.S.M.E., A.I.E.E. and A.I.C.E. arranged in two sections; first is based on inquiries and relates to engineering education in general; includes summary of general inferences and conclusions, opinions concerning extent and means of influence of engineering profession in engineering education; second, devoted to results of inquiries.

ENGINEERING MATERIALS

X-Ray Testing. X-Raying Engineering Materials, G. L. Clark. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 130–131. Abstract of paper on New Advances in the Study of Engineering Materials by Means of X-Rays; work with spectroscope in study of detonation in internal-combustion engines; continuous spectrum of hydroxyl present during burning of all kinds of gasoline; knocking due to extension of radiation; applications of X-ray examination; structures of iron, steel, copper and brass; their behavior under strains, results of annealing.

F

FACTORIES

Layout. Laying Out Plant to Increase Output, H. H. Clark. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 425–428, 8 figs. Straight-line production, minimum cost for alterations and department rearrangements, characterize Buffalo plant of Dunlop Tire and Rubber Corp.; buildings are so arranged that necessary internal changes could be made at any time with greatest facility and without alteration of building structure; also, layout was developed to provide reserve space for erection of new buildings without necessitating changes in general plan of manufacturing.

Lighting. Telltales Showing Good Factory Lighting, R. A. Palmer. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 439–441, 5 figs. Abundance of high-power lamps does not mean best illumination; location of lights, size, brightness, contrast, diffusion, reflection, shadows, are all factors helping to increase production, reduce spoilage and accidents, and improve morale, where lighting system is good.

Ventilation. Aeration of Industrial Buildings, W. C. Randall. Am. Soc. Heat. and Vent. Engrs.—Jl., vol. 34, no. 1, Jan. 1928, pp. 11–28, 14 figs. Treats of flow of air against, into and through industrial buildings without mechanical agencies; pressure of air against windows, movement of air due to temperature changes and factors which control flow of air are discussed; field surveys and correlation of model tests with surveys.

FIRE PREVENTION

Industrial Plants. Studying Plant Processes to Prevent Fires, B. Richards. Safety Eng., vol. 54, no. 6, Dec. 1927, pp. 199–204. Advocates segregation of hazardous processes, correlation of fire safety and low production costs; analysis of ultimate fire production costs; need for special protection.

FLOW METERS

Air. A New Form of Compressed Air Meter, E. J. Laschinger. Engineer, vol. 144, no. 3755, Dec. 30, 1927, pp. 747–748, 6 figs. Summary of various types of meters; none being found suitable for underground mines, author devised one combining two strong points of gate and orifice types; theory of meter, which establishes relation of various factors, was to make equal angular movements correspond to equal increments of flow; called F.M.L. graphic recorder.

Steam. Measuring and Recording the Flow of Steam. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 46–49, 9 figs. Flow meters consist of primary element acted on by fluid and secondary element transforming action of primary element into indication or record of amount of flow; flow nozzles; thin-plate orifice; fundamental equation of flow.

FLOW OF AIR

Effect of Temperature on Viscosity of Air. On the Effect of Temperature on the Viscosity of Air, R. S. Edwards and A. O. Rankine. Roy. Soc.—Proc., vol. 117, no. A776, Dec. 1, 1927, pp. 245–257, 4 figs. Ratios of viscosities of air at various temperatures between 15 and 444.5 deg. cent. have been determined, using constant-volume method and vapor jackets to obtain definite temperatures; results are compared with work of previous observers.

FLOW OF STEAM

Measurement. Measurement of Steam Flow in Works Practice, H. C. Armstrong. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 270–273, 2 figs. Calls attention to very valuable economies that result from use of steam meters for investigation of actual steam consumption of different steam-consuming process in factory and that of individual machines and apparatus working under plant conditions; illustrates practical method by means of which sound investigations may be carried out in simple and efficacious manner by any works engineer.

FOUNDRIES

Automobile Plants. 700 Tons Daily Melt of Auto Shop, P. Dwyer. Foundry, vol. 56, no. 1, Jan. 1, 1928, pp. 7–12 and 41, 13 figs. Third of series of articles describing methods and equipment employed in gray-ion foundry placed in operation by Buick Motor Co., Flint, Mich.; deals with melting and coremaking departments.

Equipment. Modern Equipment of Foundries (L'équipment moderne des founderies). Technique Moderne, vol. 20, no. 1, Jan. 1, 1928, pp. 49–51, 7 figs. Treats of preparation and maintenance of sands, mechanical molding machines, accessory machines.

FOUNDRY PRACTICE

United States. Foundry Practice in the United States of America, E. Longden. Foundry Trade Jl., vol. 37, Dec. 29, no. 593, pp. 227–231, 14 figs. Based on author's visit to American foundries in 1926; deals with industrial combinations, vocational training, methods of production, mass production, quality of metals used, etc.

FUEL ECONOMY

Management Interest and. Fuel Economy Affected By Management Interest, H. W. Morgan. Power, vol. 67, no. 1, Jan. 3, 1928, pp. 16–18. Author classifies boiler plants in three groups: those in which management takes keen interest in operation and knows accurately cost of producing steam; those in which management takes casual interest and knows approximately relation from month to month of amount of coal burned to products of factory; those in which management takes practically no interest and keeps no records at all of coal consumption except tons purchased; examples of equipment found in each group.

FURNACES

Heat-Treating. Furnace Development in Heat Treating and Forging, W. M. Hepburn. Am. Soc. Steel Treat.—Trans., vol. 13, no. 1, Jan. 1928, pp. 126–138 and (discussion) 138–141, 7 figs. Scientific developments in furnace equipment with particular reference to combustion, refractories, insulation, and temperature controls; outstanding modern gas-fired installations; trend of development has been to expand problem far beyond that of simple inventions into that of advancing science.

Temperature Control. Combustion Control for Industrial Furnaces, J. Ryan. Iron and Steel Engr., vol. 4, no. 12, Dec. 1927, pp. 493–498, 9 figs. Treats of advantages of automatic control from both fuel and product standpoint in gas and oil-fired furnaces; control valve governs by-pass, main flow and speed of heating; cites various industries using automatic furnace control.

G

GAGES

Plug. Cylindrical and Thread Plug-Gages. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 24–26, 3 figs. Recommendations of independent committee offered for approval of society; dimensions for handles and gaging plugs for sizes from 1/4 to 1 1/2 in.; full-page table of thread-plug dimensions giving go and not-go diameters; general specifications for thread plugs; table giving handles and cylindrical plugs; line cuts illustrating dimensions.

GEARS

Bevel. True Spiral Teeth for Bevel Gears, W. H. Carter. Machy. (Lond.), vol. 31, no. 793, Dec. 22, 1927, pp. 387–390, 17 figs. In Oerlikon spiral generating process spiral is automatically formed; characteristics and advantages; true spiral teeth aid formation of self-sustaining oil film; Oerlikon machine is of reciprocating-tool continuously rotating-work type; two tools work simultaneously planing opposite sides of teeth, but not of same tooth; all teeth are planed simultaneously; method employed ensures that teeth profiles are similar throughout their length, and that profiles shall meet at apex of cone.

Brass Castings for. Bronze and Brass Castings for Gears. Machy. (N. Y.), vol. 34, no. 5, Jan. 1928, p. 390. Recommended practice approved by American Gear Manufacturers' Assn.; use and chemical composition; chemical analysis; sampling; inspection; rejection.

Reduction. Speed Reducer Types, C. G. Wennerstrom. Concrete, vol. 32, no. 1, Jan. 1928, pp. 113–115, 8 figs. Discussion of several types of speed reducers, their design, capacities and suitability for various industrial uses.

Testing. The Influence of Elasticity on Gear-Tooth Loads. Mech. Eng., vol. 50, no. 1, Jan. 1928, pp. 65–67. Progress Report No. 9 of A.S.M.E. special research committee on Strength of Gear Teeth. Test runs with cast-iron gears, calculated amounts of separation on these gears show much greater variations than on hardened and ground steel gears; in general, cast-iron gears show greater amounts of separation than semi-steel gears.

GRINDING

Automobile Parts. Abrasive Engineering Practice in Automobile Manufacturing Plants–VIII, F. B. Jacobs. Abrasive Industry, vol. 9, no. 1, Jan. 1928, pp. 14–16, 2 figs. Advantages of centerless grinding in automotive production; finishing push rods in Ford plant; through feed and vertical opposed types; piston, brake shoe, piston-pin and valve-tappet grinding operations; average set-up time less than on center type; made practically automatic by attachments; table gives wheels for various types of centerless grinding work.

Depth of Cut. Grain Depth of Cut Explained, G. I. Alden. Abrasive Industry, vol. 9, no. 1, Jan. 1928, pp. 9–12, 2 figs. Operation of abrasive wheels in machine grinding outlined; correct grain depth of cut as determining successful performance of wheel; reprint of paper presented to A.S.M.E. in 1924; tables giving lengths of arcs of contact and values for wheel dimensions and contact arcs.

Surface. Precision Surface Grinding, E. C. Larke and F. C. Smith. Machy. (Lond.), vol. 31, nos. 791 and 793, Dec. 8 and 22, 1927, pp. 308–312 and 351–354, 21 figs. Dec. 8: Precision surface grinding dependent upon skill of operator, accuracy of machine, and correct composition of grinding wheel; fundamental rules governing choice of wheels; results of wrong choice; grades of wheels; form wheels; mounting of wheels; hollowing and cornering; wheel speeds; feeds; preparation for lapping; machine maintenance; swiveling angle plate; magnetic chucks; producing accurate angles on wheels. Dec. 22: correcting chuck jaws; two-jaw chucks; correcting chasers for spacing of pitch; use of slip gages; grinding of form tools of simple and more complicated type; measurement methods; dovetail-type form tool; grinding form tool; producing accurate radii on wheels; 12 line cuts showing details.

GRINDING MACHINES

Disk. Besly Disk Grinder. Abrasive Industry, vol. 9, no. 1, Jan. 1928, pp. 27–28, 2 figs. Power operated, oscillating tables equipped with both geared lever and oil feed and direct-connected motor are salient features of improved model of Charles H. Besly & Co.; oil-feed cylinders for operating table top to and from grinding wheels; dry belt-driven disk grinder equipped with disk and roll feed and semi-automatic feeding fixture also described.

Equipment. Describes Practical Devices for Grinding Balls and Handwheels, E. Viall. Abrasive Industry, vol. 9, no. 1, Jan. 1928, pp. 1–3, 5 figs. Emergency mountings for odd jobs in lathe or drilling machine; production methods on radial grinder; attachment for ball-end work on universal toolroom grinding machine; ball-end production on Cincinnati centerless grinder; handwheel grinding on special machine and by means of attachment for old-style machine.

Gear Cutters. Cutter Sharpener. Abrasive Industry, vol. 9, no. 1, Jan. 1928, pp. 25–26, 1 fig. For sharpening spiral, bevel and hypoid gear cutters used on Gleason spiral bevel roughers and generators; handles 6-, 9- and 12-in. cutters; only circular motion of grinding wheel; table automatically moved back amount ground away; stop-wheel type index individually powered by $^1/_4$-hp. motor.

Knives. Knife Grinder. Abrasive Industry, vol. 9, no. 1, Jan. 1928, p. 26, 1 fig. Developed in seven sizes by S. C. Rogers & Co.; equipped with ball-bearing spindle; double ratchet feeding device automatically controlling cross feed; for grinding woodworking, paper, hog, and veneer knives and light shear blades up to $^3/_4$ in. thick; knife table set at different angles to grinding wheel for grinding straight or concave bevels; wet grinding attachment.

Surface. New Surface Grinder. Iron Age, vol. 120, no. 26, Dec. 29, 1927, p. 1788, 3 figs. Hydraulic machine is recent addition to line of Norton Co., Worcester, Mass., and replaces open-side model previously marketed; designed to carry two lengths of tables, one for grinding work up to 36 in. in length, other for work not exceeding 48 in.

Surface Grinding Machine. Abrasive Industry, vol. 9, no. 1, Jan. 1928, p. 25, 2 figs. Hydraulic table traverse and two lengths of table for grinding work up to 36 in. and 48 in. in length are new features of Norton Co. model; table movements controlled by two levers; table speeds varied from 30 to 90 ft. per minute.

H

HAMMERS

Steam. High Frame Type Guided Ram Hammer. Boiler Maker, vol. 22, no. 12, Dec. 1927, p. 352, 1 fig. Developed by Chambersburg Engineering Co.; with this hammer it is possible to forge large disks and rings, to upset high stems, form arch bars, etc., on most economical size of tool; long punching with drafts is facilitated.

HEAT-TREATING EQUIPMENT

Electric. Selecting Electric Heat-treating Equipment. Machy. (Lond.), vol. 31, nos. 790 and 791, Dec. 1 and 8, 1927, pp. 257–259 and 313–315, 11 figs. Two articles explaining points to consider in planning installations; heating elements, terminals, terminal connections, furnace voltage, and furnace control discussed; heating elements as weakest parts of electric furnace; chart for determining worth of heating-element designs; furnaces for temperatures in excess of 1850 deg. fahr.; necessity for conservatism in rating heating units; factors limiting total radiation of coils; automatic control of temperature essential.

HEATING

House. How Reduced Night Temperature Cut Fuel Bills, T. H. Smoot. Fuel Oil, vol. 6, no. 7, pp. 27–32, 2 figs. Shows exactly what economy can be derived from careful regulation of night temperature; if advantage is taken of reduced temperature operation at night over entire heating season, savings corresponding to system which develops average seasonal heating load of 33 per cent are respectively $5^1/_8$, 10, and 14 per cent, for night temperatures of 65, 60 and 55 deg.

HEATING, GAS

Chicago Plants. Gas Heating in Chicago, H. B. Johns. Domestic Eng. (Chicago), vol. 121, no. 12, Dec. 17, 1927, pp. 20–22, 4 figs. Practice followed by Peoples Gas Light & Coke Co. of Chicago in installing gas-heating plants in buildings; cost of such plants and running cost.

HEATING, STEAM

Central. Urban Distribution of Heat. Project of Paris Distribution System (La distribution urbaine de la chaleur. Project de réseau de distribution parisien), M. Baudot. Génie Civil, vol. 91, no. 25, Dec. 17, 1927, pp. 618–621, 5 figs. Description of installation to provide steam heat in Paris from central station; terms of concession granted for Paris distribution of steam; scale of prices and participation of city in profits.

Exhaust-Steam. Improvements in Heating System Save Four Times Their Cost, J. C. Evans. Power, vol. 67, no. 1, Jan. 3, 1928, pp. 27–28. Exhaust steam for industrial processes used for building heating, instead of high-pressure steam, in factory engaged in manufacture of rubber products; operation of heaters made automatic.

HYDRAULIC PRESSES

Wheel-Forcing. Hydraulic Wheel-forcing Presses. Mech. Wld., vol. 82, no. 2135, Dec. 2, 1927, pp. 411–412, 2 figs. Describes machine capable of exerting a total load of 200 tons which will accommodate wheels up to 3 ft. 9 in. over tread and axles 7 ft. long; employed for mounting and demounting wheels of locomotives, railway and street cars, mine cars, etc.

Vertical. Defiance No. 727 Vertical 60-Ton Hydraulic Press. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, p. 1031, 1 fig. For use in pressing objects together in automobile plants and wheel plants; stroke of ram does not exceed 8 in.; hydraulic pump of double-acting type; adjusted safety valve attached to pump set to release force at any desired pressure; working surface of table top 28 in. in diameter.

HYDRAULIC VALVES

Efficient. An Efficient Hydraulic Valve. Iron and Coal Trades Rev., vol. 115, no. 3119, Dec. 9, 1927, p. 866, 2 figs. Designed by H. Crowe; body is of bronze and it is subject to no wear; valves are guided nearly throughout their entire length, and detachable seats are made of special nickel alloy; valves are not subjected to any side pressure, due to design of cages which cause water to flow evenly through series of ports around valve.

I

ICE MANUFACTURE

Raw-Water System. Design Features of a Raw-Water Ice-Making System, T. Mitchell. Power, vol. 67, no. 2, Jan. 10, 1928, pp. 63–65, 5 figs. Author discusses merits of various designs of agitating tubes; he claims that medium pressures are best and recommends drawing of air from over tank.

Plant. Inwood Consumers Ice Corporation New Plant, T. Mitchell. Ice and Refrigeration, vol. 73, no. 6, Dec. 1927, pp. 442–444, 5 figs. Description of plant of Inwood Consumers Ice Corp., New York City; ice-making capacity 120 tons daily; conveyors, tiering machine, cranes, spray system, compressors, motors, pumps, etc., are described.

INDICATORS

Steam-Engine. Measurements on Steam Engines and Turbines. Power Plant Eng., vol. 32, no. 1, Jan. 1, 1928, pp. 52–54, 5 figs. Determination of pounds of steam per kw-hr., and per indicated horsepower-hour; use of indicator; tests by weighing condensed steam; use of dynamometers; measurement on steam turbines.

INDUSTRIAL MANAGEMENT

Cost Accounting. See COST ACCOUNTING.

Financial Budget. The Financial Budget, L. F. Musil. Am. Mgmt. Assn.—Annual Convention Series, no. 66, 1927, 16 pp. Discusses following questions: Is it purpose of financial budget to give probable cash receipts and requirements, so that treasurer can plan banking transactions and arrange maturities to best advantage of company? Should financial budget be made before or after other budgets? Where is proper starting point for preparation of financial budget? Where can disbursement estimates be obtained and how can their accuracy be checked?

Motion Study. See MOTION STUDY.

Maintenance Control. Improvements and Maintenance Budgets, E. L. Usner. Am. Mgmt. Assn.—Annual Convention Series, no. 63, 1927, 16 pp. including discussion. Author, who is Comptroller of Budgets of Marion Steam Shovel Co., states firm's general budget method; production and sales budgets for year are established and production budget is then broken up into departmental requirements; expenses are divided into classifications, fixed and variable; draws sharp distinction between method of handling maintenance to buildings, and maintenance to machinery and equipment, as far as control of expense is concerned, and these methods are discussed separately.

Piece Work. A New Piece-Work Theory, R. J. Franklin. Can. Machy., vol. 38, no. 25, Dec. 22, 1927, p. 17, 4 figs. Attempt to show how vitally depreciated machine tools affect operators; efficiency of machine should be taken into consideration when setting price; writer has never seen this raising of piece-price for machine-depreciation theory either in practice or writing.

Production Control. Cutting Costs 20% and Making 100% on Time Shipments, J. Hearty. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 451–455, 7 figs. Describes system of production control in Imperial Electric Co.; plant of 135 employees gets remarkable results from most flexible system which also reduces inventory 25 per cent; routing of order strips; schedule of shipping dates; materials-control board.

Production Control in the Black & Decker Manufacturing Co., W. A. Rowe. Am. Mgmt. Assn.—Production Executives' Series, no. 62, Apr. 1927, pp. 3–8 and (discussion) 8–11. Factory production control is not confined to departmental limitations, but embraces all branches of business; firm, of which author is production manager, manufactures portable electric drills, screw drivers, valve refacers, bench grinders, etc., line comprising 54 varieties of units; leading factor in system is sales quota sheet; manufacturing control chart; planning work for factory.

Profit Management. Safeguarding Net Profits, C. E. Knoeppel. Soc. Indus. Engrs.—Bul., vol. 9, no. 12, Dec. 1927, pp. 3–6. Author maintains that what is produced regardless of volume or capacity should not absorb all overhead expenses; variations in prices of important or basic materials should not be included in cost; profit should bear relation to effort expended and its facilitation and not to total cost.

Sales Control. Marketing or Sales Budget, J. H. Barber. Am. Mgmt. Assn.—Annual Convention Series, no. 64, 1927, 20 pp., including discussion. Purpose of sales budget and steps necessary to accomplish it; not only must sales estimates be originated before other estimate schedules can be prepared, but greatest inconvenience and loss results if judgment fails here; budgeting must contribute its share toward finding out how to distribute products of mass production at constantly lowering cost per unit for distribution.

INDUSTRIAL RELATIONS

Problems. Men Are Not Machines, S. A. Phillips. Brick and Clay Rec., vol. 71, no. 13, Dec. 20, 1927, pp. 931–936, 4 figs. Increasing hours does not reduce wages; six-hour day; well being of employee must be considered; long day is expensive to manufacturer; affects cost of production; day-and-piece rate method; hour rate plus bonus.

United States. Master Planks in the American Industrial Program, W. Lewis. Taylor Soc.—Bul., vol. 12, no. 6, Dec. 1927, pp. 555–557. Improvement of living standards, increase of output and wages; cooperation of management and workers in improvement of methods; stabilization of employment.

INDUSTRIAL RESEARCH

Application of. Application of Research to Sales, Production, and Employment Problems in New England. Textile World, vol. 72, no. 25, Dec. 17, 1927, pp. 35–36. Results of investigation made by Metropolitan Life Insurance Co. of research which has been employed in New England industries dealing with sales, production and employment; covers package sizes, labor saving, customer contact, special machines, employment cooperation, team work and research.

INTERNAL-COMBUSTION ENGINES

Exhaust Gas, Testing. Interpretation of Exhaust Gas, C. C. Minter. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 19–23, 3 figs. Physicochemical aspects of exhaust gas of internal-combustion engines; composition of non-homogeneous charge pictured as manifestation of law of probabilities; ideal volumes of combustion products; probability law applied to full distribution; development of general formulas; calculations of combustion products.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

IRON-CARBON ALLOYS

Metallurgy of. The Metastable Nature of Iron Carbide, A. Hayes. Ohio State College of Agriculture and Mechanic Arts—Official Pub., vol. 26, no. 1, June 1, 1927, 51 pp., 21 figs. Free energy and heat of formation of iron carbide for temperature interval 650–700 deg. cent.; calorimetric determination of heat formation of iron carbide at room temperatures; graphitizing behavior of pure iron carbon alloys in critical range.

IRON CASTINGS

Dirty. What Causes Dirty Castings? W. F.

Prince. Foundry, vol. 56, no. 1, Jan. 1, 1928, pp. 19–20. Extended experiments showed that agitation of molten iron either by air or steam throws out sulphur and manganese in form of excessive slag; in author's opinion, machine-cast pig is not as good as sand-cast pig; machine-cast pig boils more in casting, creates more oxide and deposits more oxides in cupola which never go back into metallic form.

Properties. Castings of High Resistance (Pearlitic Cast Iron) [Les fontes à resistance elevée (fontes perilitques)], A. Le Thomas. Revue Industrielle, vol. 58, no. 2222, Jan. 1928, pp. 16–20, 6 figs. Increase in mechanical properties of high-resistance cast iron; methods of making chemical and metallographic tests; various methods of making high-resistance castings, viz., Lang, Emmel, Schuez are given; evolution of cast-iron testing.

Centrifugal Castings for Diesel Engines, J. E. Hurst. Foundry Trade Jl., vol. 37, no. 591, Dec. 15, 1927, pp. 199–201, 5 figs. Chemical composition and properties of centrifugal castings; resistance to wear and heat conditions; spun-sorbitic centrifugal castings; two most important advantages of centrifugal over vertical sand-casting processes for production of cylindrical castings are soundness and freedom from internal defects and extreme closeness and uniformity of grain size which is reflected in mechanical strength properties of this material.

L

LATHES

Automatic, Operation of. Air-operated Chucks for Automatics, O. S. Marshall. Machy. (N. Y.), vol. 34, no. 5, Jan. 1928, pp. 360–362, 6 figs. Automobile flywheel ring gears machined on Fay automatic lathes equipped with special air-operated chucks; details and operation of chuck for holding gears for turning, facing, and chamfering and of chuck for holding gears for rough- and finish-boring and chamfering; two line drawings giving details of both chucks.

Auto-lathe Production. Machy. (Lond.), vol. 31, no. 790, Dec. 1, 1927, pp. 283–284, 4 figs. Brief article giving examples of practice on new Herbert No. 3 machine; completely machining Whittle-type belt pulley in 20 min.; first operation described with special mounting and tools used; second operation in finishing work; two line cuts showing details of Whittle Belt pulley and friction ring carrier also machined on auto-lathe.

Gisholt Turret. Gisholt IL Turret Lathe. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1036–1037, 1 fig. Bar work up to 2½ in. in diameter and chucking work up to 12 in. machined; fixed-center turret standard and cross-feeding turret optional; eight independent reversible feeds incorporated in each apron and range of eight feeds available through lever at headstock end.

Turret, Cam Design. Dwell Cams and Auxiliary Slides. Machy. (Lond.), vol. 31, nos. 791 and 793, Dec. 8 and 22, 1927, pp. 292–295 and 399–401, 16 figs. Dec. 8: Development of dwell cams and auxiliary slides for automatic turret lathes; most needed on larger machines where work consists mainly of castings or forgings; two drum cams for moving turret slide and cross-slides; development of drum; auxiliary slide for mounting on back or front of cross slide; line cuts giving design and development layout. Dec. 22: Practical examples of some of many useful applications of dwell and how, given required data, to lay out cam developments; time loss resulting from roller working around peak of cam; timing of cams to cause desired relative movements; layout for taper turning; layout for turning bevel pinion blank; case in which turret dwell was required but cross-slide dwell unnecessary; line cuts showing layout for different operations.

Wheel. A Pneumatically-Controlled, Centrally Driven Wheel Lathe. Engineer, vol. 144, no. 3755, Dec. 30, 1927, pp. 736–738, 6 figs. Intended to deal quickly and accurately with any type of railway-car wheel of from 30 in. to 48 in. in diam. and can be produced to suit wheels of standard or 5-ft. 6-in. gage as required but not both in one machine; made by Noble and Lund, of Newcastle-on-Tyne; it is capable of rough turning and profiling hardest brake-hardened or sorbitic tires without vibration under maximum feeds.

LEAD ALLOYS

Ternary. Ternary Systems of Lead-antimony and a Third Constituent, R. A. Morgen, L. G. Swenson, F. C. Nix and E. H. Rober. Atms. Inst. Min. and Met. Engrs.—Tech. Pub. no. 43, Dec. 1927, 33 pp., 23 figs. Effect of addition of copper, bismuth and tin; presence of copper shifts point of maximum hardness in dispersion-hardened alloys toward higher antimony content; bismuth has little effect on solid solubility of antimony up to 225 deg. cent.; small amounts of tin tend to hold antimony in solution at lower temperatures; tin is deleterious to dispersion hardening of lead-antimony alloys.

LOCOMOTIVE BOILERS

Water-Tube. Proposed High Pressure Water-tube Locomotive Boiler, L. A. Rehfuss. Boiler Maker, vol. 22, no. 12, Dec. 1927, pp. 339–342, 349, 6 figs. Boiler designed for 500 lb. pressure indicates lines along which steam locomotives of greater efficiency and higher powers may be developed; advantages are: high pressure, superior combustion efficiency, superior circulation, quick steaming, compound superheating, safety from crown or other extensive explosions.

LOCOMOTIVES

Design. Development and Design of Modern Steam Locomotives, F. J. Carty. Steam Coal Buyer, vol. 8, no. 6, Dec. 1927, pp. 24–25, 35 and 43. Historical development, increase of weight; provision for American curves; introduction of link motion; high-speed passenger and freight locomotives; introduction of stokers; thermic system; latest mechanical improvements; turbine and 3-cylinder engines; advantages.

Diesel-Electric. The Sulzer Diesel Locomotive of the Compagnie Fermier des Chemins de Fer Tunisiens. Sulzer Tech. Rev., no. 4, 1927, pp. 1–6, 7 figs. Description of Sulzer Diesel locomotive and its trials on Tunisian Railways; 1 m. gage, 250 b.hp., weight 39 tons; engine, 8 cylinder, V-type, 550-r.p.m.; generator output, 145 kw. at maximum voltage of 800; 4 motors drive 4 axles of locomotive by spur gearing; pulls 80-ton train at 37½ m.p.h. on level.

Electric. See ELECTRIC LOCOMOTIVES.

Fireboxes, Welding. Repairing Copper Fireboxes by Welding (Réparation par soudure autogène des foyers en cuivre), M. Houlet. Revue Générale des Chemins de Fer, vol. 46, no. 12, Dec. 1927, pp. 552–564, 24 figs. Practice of Eastern Railway Co.; acetylene and oxygen are used at same time by two welders; various types of repairs are noted.

Fireless, Testing. Cooling Loss of Fireless Locomotives (Der Abkuehlungsverlust feuerloser Lokomotiven), Wichtendahl. Hanomag Nachrichten, vol. 14, no. 166, Aug. 1927, pp. 107–114, 9 figs. Tables and graphs for computation of rate of cooling and consequent decrease in pressure, for various dimensions, surface areas and water contents of locomotives, also for various outside temperatures; quality of thermal insulations and their conductivity coefficients; data on cooling rates of Hanomag fireless locomotives.

Maintenance. Engine Handling at Terminals, H. E. Bergstrom. Ry. Jl., vol. 34, no. 1, Jan. 1928, pp. 24–26, 1 fig. Treats of process of handling engines at Northern Pacific R.R. terminals, such as inspection, cleaning, coaling, sanding, etc.; organization of forces at terminals; time occupied by engine in mechanical department and economy of quick handling in terminal.

Operation. Importance of Locomotive Assignment, H. J. Titus. Ry. Age, vol. 83, no. 27, pp. 1323–1326. Treats of most economical methods of handling locomotives, as affected by their design, on various divisions on varying classes of service; costs of types are studied; locomotive service other than freight and factor of investment costs.

Passenger. The "Royal Scot" Class Express Locomotives, L.M.S.R. Ry. Engr., vol. 49, no. 576, Jan. 1928, pp. 10–15, 6 figs. These engines are engaged in hauling heavy express passenger trains on Anglo-Scottish services of L.M.S.R.; between Euston and Carlisle, 300 miles, they make longest regular non-stop run in world; cylinders, with cranks 120 deg. apart, are arranged for single-expansion working using steam at high initial pressure of 250 lb. per sq. in.; fifty of new locomotives are being built by North British Locomotive Co., several of them being already in service.

Testing. Locomotive Tests at Purdue. Ry. Jl., vol. 34, no. 1, Jan. 1928, pp. 18–19, 4 figs. Tests being made by Am. Ry. Assn. & Purdue Univ. at Lafayette, Ind. on efficiency of air brakes; half of tests completed; brake equipment for 100 car train with trainagraph which records braking time and air pressure; 30 men are carrying on tests which will be finished in a year and a half.

Thermic Siphons. Thermic Siphons on Locomotives. Ry. Jl., vol. 34, no. 1, Jan. 1928, pp. 34–36, 13 figs. Describes Nicholson siphon applied to fireboxes of locomotives; it acts to keep crown sheet covered with water and aids steaming by increasing firebox surface, increases water circulation and efficiency of locomotive.

Three-Cylinder Compound. Some Experimental Results from a Three-cylinder Compound Locomotive, L. H. Fry. Engineer, vol. 144, nos. 3754 and 3755, Dec. 23 and 30, 1927, pp. 718–720 and 731–734, 17 figs. Also Ry. Gaz., Dec. 23, pp. 792–793. Dec. 23: Experimental study of cylinder action of locomotive using boiler pressure of 350 lb. per sq. in.; locomotive built as experiment by Baldwin Locomotive Works in 1926; after thorough series of tests on Pennsylvania R.R. locomotive-testing plant at Altoona it has been tried in service on number of important railways in United States with very satisfactory results; tendencies in American locomotive design. Dec. 30: Heat transfer to high-pressure cylinder walls during admission; it has been shown that with steam pressure of 350 lb. per sq. in. above atmosphere highest possible theoretical cylinder efficiency is 16.5% and that about five expansions are required for this. Paper read before Instn. Mech. Engrs.

Trends, United States. Recent American Locomotive Practice, E. C. Poultney. Ry. Engr., vol. 49, no. 576, Jan. 1928, pp. 19–23, 7 figs. Comprehensive survey of modern locomotive developments in United States; treats certain locomotive features from 1892 to date giving principal dimensions of Pacific type and New York Central Hudson type; feed heating, smoke-box regulators.

Yard, Operation. Triple-Crewing Yard Locomotives, H. R. Fertig. Ry. Age, vol. 83, no. 27, pp. 1317–1320. Gives results of Rock Island in working yard locomotives over continuous periods of time, proving economy of operation, reduction of congestion at ashpits, turntables and round houses and increase of efficient operation in yards.

M

MACHINE DESIGN

Details. Machine Details, F. W. Shaw. Machy. (Lond.), vol. 31, no. 790, Dec. 1, 1927, pp. 261–263, 7 figs. Gives advice to follow in design of lugs and flanges; view of article with several defects and alternative forms; alternative forms of boss for turret-lathe gear cover; cases where simplification is desirable; table of standard lugs and flanges; flanges for vices and fixtures; simplification in patternmaking; 6 line cuts to illustrate forms. (Continuation of serial.)

MACHINE SHOPS

Equipment Replacement. What Modern Equipment Has Done—The Treadwell Eng. Co., A. A. Neave. Am. Mach., vol. 68, no. 1, Jan. 5, 1928, pp. 1–4, 9 figs. First of series of articles giving actual results achieved by replacing obsolete with up-to-date equipment; rolling-mill equipment, tube-mill machinery and hot metal and cinder cars are principal products; nine line drawings of parts with comparison of old and new operations and time saved in per cent.

Maintenance Costs. Efficient Effort by Machine-Shop and Section Men Essential for Lowered Maintenance Costs, H. H. Her. Textile World, vol. 73, no. 1, Jan. 7, 1928, pp. 71–73. Discusses maintenance of high productions and low expenses; intelligent salvaging of broken and worn machine parts, together with careful and correct installation and adjustment of both new and repaired parts from viewpoint of master mechanic.

Power Equipment. Source of Energy in Shops (La fourniture de l'energie dans les ateliers), C. R. Dartevelle. Technique Moderne, vol. 20, no. 1, Jan. 1, 1928, pp. 63–65. Machines should be controlled individually and preferably electric; various systems of power are treated and their economical value discussed; steam, electricity and Diesel motor; and batteries are treated.

Practice, Progress in. Progress in Machine-Shop Practice. Mech. Eng., vol. 50, no. 1, Jan. 1928, pp. 56–60, 3 figs. Report contributed by Machine-Shop Practice Division of A.S.M.E. Economic factors influencing metal-working industries; changes in machine tools; machine drives; advances in grinding practice; development of machine tools for use in automotive industry; advances in grinding practice; process and machines of year; standardization.

Tool Equipment. Modern Machinery of Mechanical Industries (Le matériel moderne des industries mécanique), M. Dalbouze. Technique Moderne, vol. 20, no. 1, Jan. 1, 1928, pp. 1–40, 114 figs. Treats of machine tools for metal working, such as lathes, milling machines, radial drills, shapers, planers, grinders, mortisers,

grinding mills, chucking machines, forging machines, plate-working machines, punches, presses; methods of driving machines by electric motor, also machinists' tools and portable tools, riveters, air hammers, recent construction and tendency in power transmission, pumps and compressors.

MACHINE TOOLS

Design Trend, England. The Trend of Machine Tool Design. Machy. (Lond.), vol. 31, no. 792, Dec. 15, 1927, pp. 321–328, 17 figs. Developments of importance to users of machine tools; shortening non-productive periods; beds and slideways; duplex and multiple heads; direct motor drives; electric control; hydraulic operation; loading devices. See also p. 329 for article on Trend of American Machine Tool Practice.

England, Models of 1927. Production Machines of the Year. Machy. (Lond.), vol. 31, no. 792, Dec. 15, 1927, pp. 331–348, 40 figs. Detailed account of features that make for high output and cost reduction and samples of their application.

MALLEABLE CASTINGS

Properties. The Black Heart of Malleable Castings (Ueber den schwarzen Kern des Tempergusses), O. Quadrat and J. Koritta. Giesserei, vol. 14, no. 49, Dec. 3, 1927, pp. 849–854, 5 figs. Investigations of composition of original white iron and black core; its mechanical properties and strength; influence of heat treatment on mechanical properties of black core; purpose of investigation was to determine conditions for heat treatment of black-heart malleable.

MANUFACTURING PLANTS

United States. Impressions of My First Trip to America (Eindruecke von meiner ersten Amerikareise), I. Lauster. V.D.I. Zeit., vol. 71, no. 51, Dec. 17, 1927, pp. 1765–1769. Observations on organization, manufacturing methods, labor and industrial relations in 23 American plants, among them Ford, General Electric, Westinghouse Electric, etc.; special report on manufacture of Diesel engines, Diesel locomotives and Diesel motor vehicles (J. G. Brill Co.); lessons for German manufacturers.

MATERIALS HANDLING

Flour Mills. Laborless Handling at Pillsbury Mills, F. D. Campbell. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 447–450, 4 figs. Thousands of feet of conveyor system operated through automatic central control board accomplish remarkable economies in loading of bags of flour and feed; instructions for use of conveyors; connection of conveyors; methods of conveyor operation; operation of packing machines.

Progress in. Progress in Materials Handling. Mech. Eng., vol. 50, no. 1, Jan. 1928, pp. 13–18, 6 figs. Report contributed by Materials-Handling Division of A.S.M.E. Developments in cranes, hoist and tramrail equipment, elevators, electric industrial-transportation equipment, hand lift trucks, skid shipment of materials, gasoline truck and tractor equipment, conveyors and pneumatic equipment; layout in paper industry; foundry practice; construction and railway field; marine handling; ceramic industries.

METALS

Cohesion. Cohesion. Metallurgist (Supp. to Engineer), Dec. 30, 1927, pp. 177–178. Refers to recent discussion on cohesion organized by Faraday Society which served to show how much still remains unknown in regard to atom and its means of attachment to its neighbors; when it is known why and how cohesion is developed to such widely varying degrees in different materials, metallurgists will have key to selection of those best suited for given purpose, and to production of new combinations of matter, but understanding of fundamental phenomena of cohesion is still very remote.

Coloring. Antique Finishes on Copper and Brass, N. Richard. Metal Industry (Lond.), vol. 31, no. 24, Dec. 16, 1927, p. 562. Brown-reddish-bronze-blue-black tones in copper; antique green oxidizing effect; hardware green finish; blue or black on brass; blackening brass.

Fatigue. Fatigue Phenomena with Relation to Cohesion Problems, H. J. Gough. Metal Industry (Lond.), vol. 31, no. 24, Dec. 16, 1927, pp. 557–561. For purposes of present note, fatigue phenomena is understood to be characteristics exhibited by metals when subjected to cyclical variations of stress or strain; fatigue test on crystalline aggregates; deformation by slip; attrition theory; hardening as result of slip; test shows, broadly, that effect of boundary is mainly one of "interference" due to differing orientation of neighboring crystals; experiments upon effect of fatigue stressing upon density of aluminum.

MILLING MACHINES

Attachments. Increasing the Usefulness of Milling Machines, H. Rowland. Can. Machy., vol. 38, no. 25, Dec. 22, 1927, pp. 13–14, 5 figs. Describes attachments to use on milling machines to increase variety of work done; heavy vertical milling attachment; rack milling attachment, universal spiral and circular milling attachment.

Standard Attachments for Standard Milling Machines, H. Rowland. West. Machy. Wld., vol. 18, no. 12, Dec. 1927, pp. 575–577 and 588, 8 figs. Machine tool capacity practically doubled with very little additional cost by use of accessories or additional parts of standard machine; M-type miller and heavy vertical milling attachment; all-steel vise for handling rough work; vertical milling attachment for key-seating, die sinking, milling key slots; slotting attachment; rack milling attachments; spiral attachment for milling spirals at any angle; circular milling and high-speed milling attachments.

Duplex. Duplex Drilling, Boring, Milling and Screw-Cutting Machine. Engineering, vol. 124, no. 3232, Dec. 23, 1927, p. 805. Heavy-duty, full-universal, machine constructed by W. Asquith, Ltd., of Halifax; bedplate is 30 ft. in length, 6 ft. wide and 1 ft. 8 in. deep, and is accurately machined to carry sliding bases for columns on which spindles are mounted.

MOLDING

Center Plate. Manufacture of a Bronze Center Plate for a Briquetting Machine (Mémoire sur la fabrication d'un centre de plateau bronze d'appareil à fabriquer les briquettes), F. Simorre. Fonderie Moderne, vol. 21, Dec. 10, 1927, pp. 488–496, 8 figs. Details of making molds and core boxes; sand mixture; methods of pouring; charging furnaces; mixtures to use and time taken for different operations in foundry when making bronze center plate weighing about 900 kg.

Costs. Short-Cut Method to Find Molding Costs, M. R. Lott. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 443–446, 6 figs. Author has worked out simple and satisfactory solution for molding cost of brass and aluminum castings which are variable items.

MOLDS

Water-Cooled. Water-Cooled Chill Moulds. Metal Industry (Lond.), vol. 31, no. 24, Dec. 16, 1927, pp. 560–561. Criticisms on article entitled "Water-Cooled Chill Moulds in Brass Foundries," in same journal for Nov. 18; author claims that for casting rolled plates, only one kind of water-cooled chill mold is recognized practically and widely adopted in brass industry, namely, cooling form made by Junker, of Solberg, Rhineland; claim can be emphatically maintained that such molds never wear down.

MOTION STUDY

Machining Metal. Time Losses in Machining Practice. Mech. Wld., vol. 82, no. 2137, Dec. 16, 1927, pp. 450–451, 3 figs. Methods of speeding-up movements at specific periods, reducing non-cutting motions to briefest time, stopping drives or feeds instantly, varying either of these frequently to get best output, and using rapid-power mechanism for adjustments and clampings.

Skilled Workers and. Skilled Workers and Motion Study, Your Assets, A. B. Segur. Soc. Indus. Engrs.—Bul., vol. 9, no. 12, Dec. 1927, pp. 11–14 and 18. Many a workman is working at routine job earning mediocre pay, striving to prevent some short-sighted engineer, manager or superintendent from cutting rate, when he has ability which would carry him far beyond worry over rate on any job; he could help manager more than banks, engineers or psychologists, if he had ability to make his skill useful to others; to discover such workmen to themselves is function of motion-time analysis.

MOTOR BUSES

Brakes. When It Comes to Brake Application We Prefer Air, J. G. Hofgaard. Bus Transportation, vol. 7, no. 1, Jan. 1928, pp. 13–14, 3 figs. Compared with mechanical and hydraulic type brakes in company where all three are used superiority briefly shown from operating standpoint and maintenance angle; higher initial cost justified by low maintenance; maintenance cost one-half that of others; mileage compared; hard and soft linings.

Design, England. The Six-cylinder Maudslay. Motor Transport, vol. 45, no. 1188, Dec. 19, 1927, pp. 821–823, 8 figs. New passenger model intended for single-deck omnibus and saloon-coach service; bore and stroke of 110 × 130 mm.; alternative engine with bore of 100 mm. will be available; seven crankshaft bearings; overhead valves operated by separate camshafts; auxiliary driving gear; valve mechanism; unusual arrangement of manifolds; clutch and gear box design; frame construction; servo-operated brakes; unusual radiator mounting.

Emergency Uses. Motor Coach Valuable Asset in Emergency. Ry. Age, vol. 83, no. 26, Dec. 24 (Section 2), 1927, pp. 1289–1291, 3 figs. Describes Boston and Maine uses of motor buses to help out service which was interrupted by flood in New England; mail, baggage and passengers were handled on train schedule time over long and short routes, smooth and rough roads.

Exhibition, London. International Commercial Motor Transport Exhibition. Tramway and Ry. World, vol. 62, no. 30, Dec. 15, 1927, pp. 343–357, 30 figs. Shows many photos and gives description of buses from 30 makers; many 6-wheel buses were shown; 4-wheel brakes were fitted in many cases and two types of power brakes, one vacuum servo and one compressed air.

Specifications. Condensed Specifications of Motor-Vehicle Chassis for Bus Service. Bus Transportation, vol. 7, no. 1, Jan. 1928, pp. 44–45. Two-page table giving trade name and model, chassis list price, seating capacity, weights, main dimensions, engine details, electrical equipment, transmission, axles, steering gear, brakes, wheels, tires.

Steam. Results Attained by a Steam Bus in Actual Service, J. F. Miller. Bus Transportation, vol. 7, no. 1, Jan. 1928, pp. 5–7, 3 figs. Observations of Detroit Motorbus Co. on its successful operation of 61-passenger, double-deck, steam-driven bus for 28,000 miles; possibilities of steam power plant proving superior to gasoline engine in city service; favorable operating characteristics; steam-engine mounting; power-plant details; independent control system; engine details; eliminating early troubles; gasoline or oil as fuel.

MOTOR TRUCKS

Design. Truck Fields and Features, B. B. Bachman. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 132–134. Survey of requirements and discussion of general mechanical design; power-driven auxiliary equipments markedly improved; desirability of large vehicles questioned; worm-gear and chain-drive applications; improved steering-gears reduce driving effort; braking problem tied up with linings; need of general service stations. Abstract of paper read at Dayton meeting.

House-to-House Delivery. A Motor-Vehicle for House-to-House Deliveries, L. Oldfield. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 87–95, 11 figs. Description of Pak-Age-Car; load capacity of one and two-thirds times weight; 1 qt. gasoline per hr. consumed and 1 qt. engine oil per week; occupies 50 sq. ft. floor space; turns in 30-ft.-wide street; maneuverability; driver stands as he manipulates implified control; no chassis frame or axles; specially designed two-cylinder opposed engine; power-plant assembly readily removable.

Freight Service. Economic Aspect of Hauling L.C.L. Freight by Motor Trucks, F. J. Scarr. Ry. Age, vol. 83, no. 26, Dec. 24 (Section 2), 1927, pp. 1303–1304. Comparative statistics of hauling cost of freight by various methods and comparison of productive ability of individual in transporting freight; motor hauling compared with railroad hauling for various classes of freight.

Substation Maintenance. Substation Maintenance Truck, R. L. Boisen. Elec. World, vol. 90, no. 25, Dec. 17, 1927, pp. 1241–1242, 2 figs. Equipped to handle all of usual substation maintenance and route testing employed by Lake Superior District Power Co. and Northern division of Michigan Gas & Elec. Co. for testing and purification of transformer oil, replenishment or changing of oil, inspection of lightning arresters and testing ground resistances.

O

OIL ENGINES

American M.A.N. Americanizing an Established European Design. Oil Engine Power, vol. 6, no. 1, Jan. 1928, pp. 39–44, 14 figs. Cooper M.A.N. oil engine represents result of three years' intensive effort devoted to adaptation of well-known German design to American operating and production standards.

Compressorless. A New 4-cycle Compressorless Oil Engine. Motorship, vol. 8, no. 1, Jan. 1928, pp. 40–45, 8 figs. Its characteristics and potentialities with special reference to Hesselman combustion chamber, and membrane fuel valve; test results on 400-hp. Hesselman Diesel are given showing high mechanical and thermal efficiencies; needle valve is replaced by membrane fuel valve.

Pumping with. Pumping Cost Cut Seventy-Odd Per Cent, R. G. Skerrett. Compressed Air Mag., vol. 33, no. 1, Jan. 1928, pp. 2277-2280, 12 figs. Norman, Oklahoma, has done this by adopting oil-engine drive in municipal water works; describes city of Norman, its water supply, how handled by steam pumps and change to oil-engine drive operating electric generator and air compressors for air lifts in wells; comparison of cost of two systems favors oil-operated engines.

OPEN-HEARTH FURNACES

Regenerators. Kuehn Open-Hearth Regenerators. Iron and Coal Trades Rev., vol. 115, no. 3119, Dec. 9, 1927, p. 868. Results from 30-ton furnace rebuilt and equipped with Kuehn regenerators at very moderate cost.

OXYACETYLENE CUTTING

Acetylene vs. City Gas. Acetylene and City Gas, J. K. Mabbs. Acetylene Jl., vol. 29, no. 7, Jan. 1928, pp. 275-278, 2 figs. Some laboratory studies which were made to show their relative values as fuel gases for cutting metals by oxidation; highest possible preheating temperature and ability to start cut quickly under all conditions are always of advantage and these desirable characteristics can be obtained only through use of acetylene.

P

PACKING

Shipments of Machinery. Packing and Transportation of Engineering Supplies and Machinery for Foreign Markets (Entwurf, Transport und Verpackung im technischen Aussenhandel). K. Lubowsky. Gewerbefleiss, vol. 106, no. 11, Nov. 1927, pp. 209-226, 37 figs. Principally on practice of A.E.G. (Allgemeine Elektrizitaets Gesellschaft); testing of boxes and crates; transportation of cables, transformers, etc.; traveling cranes, electric trucks, loading and unloading of locomotives, crating of heavy machinery, motor buses, etc.; floating cases, disassembling for transportation by mules, etc.

PAINTING

Mechanical. Paint Application by Mechanical Means, R. C. Sheeler. Indus. Power, vol. 14, no. 1, Jan. 1928, pp. 49-54, 8 figs. Advantages of spray painting and proper method of using equipment to gain best results are pointed out.

PARACHUTES

Lobe. The Russel Parachute, J. M. Russell. Aviation, vol. 23, no. 26, Dec. 26, 1927, pp. 1508-1510, 5 figs. Description of lobe parachute and principle on which it operates; normal speed of descent attained; adjustable harness; short time required for operating; other interesting details of construction.

PIPE, CAST-IRON

Joints. Bronze Joints in Cast Iron Pipe, T. C. Fetherston. Iron Age, vol. 120, no. 26, Dec. 29, 1927, pp. 1782-1784, 4 figs. Four years' service experience indicates weaknesses in butt joints with collar welds; new "shear-vee" design proves cheaper and twice as strong.

New Bronze Joint Has High Strength, T. W. Greene. Acetylene Jl., vol. 29, no. 6, Dec. 1927, pp. 246-248, 5 figs. Comparison of three types of welded pipe joints; collar-type joint failures analyzed; advantages of Shear-Vee joint in giving 100 per cent more strength than collar joint and developing full strength of pipe, cheaper and easier to make, graphical stress transfer shown for both types of joint.

Welding. Developments in Cast Iron Pipe, H. Y. Carson. Am. Water Wks. Assn.—Jl., vol. 18, no. 6, Dec. 1927, pp. 721-727, 4 figs. Eliminating joints by welding; bronze welding; one table of practical bronze-welding data; large pipe with welded tees; cement-lined cast-iron pipe.

POWER PLANTS

Design. The Role of the Civil Engineer in Power Development, I. W. McConnell. Am. Soc. Civ. Engrs.—Proc., vol. 54, no. 1, Jan. 1928, pp. 155-164, 1 fig. Argues and demonstrates with examples from practice that civil engineer has more opportunity to effect economies in construction of works for production and distribution of power than any other type of engineer connected with design.

Equipment. Choosing Power Equipment, J. N. Landis. Elec. World, vol. 90, no. 25, Dec. 17, 1927, pp. 1237-1241, 19 figs. Method of evaluating bids based on curves plotted from operating conditions and guaranteed performance; examples of application to specific cases; basis for calculating annual carrying charges; development of load-duration curves; determination of installation costs.

Hydroelectric. Bavaria's Hydroelectric Plants at the Beginning of 1927 (Die Bayerischen Wasserkraftanlagen zu Beginn des Jahres 1927). Bautechnik, vol. 5, no. 55, Dec. 23, 1927, pp. 805-807, 2 figs. Statistical data on number of plants by watersheds, volume of power produced and industrial uses; statistics of growth of water-power developments since 1800; statistical data on electric power production in Germany by sources of supply, viz., water, coal, oil, gas and wind.

Outdoor Hydro Plant, J. Franz. Elec. World, vol. 90, no. 27, Dec. 31, 1927, pp. 1350-1351, 2 figs. An 18-in. Leffel, Type Z turbine was placed in concrete flume with open setting, draft tube, extension shaft and thrust bearing to support turbine shaft and generator rotor and care for hydraulic thrust; although this plant is very small, writer sees no reasons why same thing cannot be carried out on larger types of synchronous machines.

Paris-Orleans Railway Electrification. Ry. Engr., vol. 49, no. 576, Jan. 1928, p. 9, 4 figs. Describes power station for electric railway at Coindre operating three hydraulic turbines of 10,500 hp. each and driving generators of 8500 kw. at 5500 volts and 50 periods; fed by reservoirs through fall of 120 m.; scheme is based on equalization of falls by galleries, which unite.

West Buxton Hydroelectric Plant—Additional 5,000 Kva. Unit, G. E. Haggas. Boston Soc. of Civil Engrs. Jl., vol. 14, no. 10, Dec. 1927, pp. 511-529, 8 figs. Space problem for extra 2000 cu. ft. per sec. worked out by building double intake and buried pressure tunnel; concrete scroll of power-house substructure, surge chamber, conduit and intake designed for full hydrostatic head under maximum high-water conditions; six-bladed propeller-type runner 133 in. diam.; generator provided with amortisseur windings, 125-volt direct connected exciter; spring-type thrust bearing, 325,000 lb. capacity.

Management. 11 Fundamentals of Management Save Money in the Boiler Room, H. L. Griffin. Mfg. Industries, vol. 14, no. 7, Dec. 1927, pp. 461-463. Discusses fundamentals which have been successfully applied in a dozen or more factory power plants.

Steam vs. Water Power. Relation of Steam to Water Power, A. H. Markwart. Power, vol. 67, no. 1, Jan. 3, 1928, pp. 39-41, 4 figs. With hydro equipment nearing maximum efficiency and development costs increasing, and marked improvement in steam-plant economies, it would appear that ultimate development of water power must involve use of proportion of steam power; it is quite probable that combination system will generate at lower cost than either steam or hydro alone; economic study of factors involved in these two power sources.

Steam, High-Pressure. Experiences with 1300 lb. Steam Pressure, J. Anderson. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 266-270, 4 figs. Though high-pressure installation at Lakeside Station, Milwaukee has been in service 57 per cent of 11-months period since starting, operating one continuous period at full capacity for 50 days and improving overall plant efficiency 4 per cent, major troubles have been experienced which are discussed in detail; condenser leakage; boiler-tube failure. (To be continued.)

Steam, Management of. Fundamentals of Management Save Money in the Boiler Room, L. H. Friggin. Paper Trade Jl., vol. 85, no. 26, Dec. 29, 1927, pp. 47-49. Eleven major principles are given for boiler-room management and these are discussed; kind of equipment to add and importance of power-plant instruments and keeping of records emphasized.

Steam-Electric. Arsenal Hill Station Southwestern Gas and Electric Co. Power, vol. 67, no. 2, Jan. 10, 1928, pp. 50-53, 5 figs. 30,000-kva. station installed at Shreveport, La.; 3 turbo-generators deliver current at 11,500 volts; there are 6 water-tube boilers of 11,800 sq. ft. each; 3 of box-header horizontal-drum type, and other 3 of cross-drum serpentine sectional-header design; all are fitted with convection-type superheaters; station is example of how cost of fuel influences design and first cost of equipment; with cheap gas there was no incentive to go to high pressures, to install economizers, preheaters, combustion control or to use steam reheating.

A Year's Operation of Power Plant at Betty Furnace, Central Alloy Steel Corporation, J. D. Donovan. Iron and Steel Engr., vol. 4, no. 12, Dec. 1927, pp. 500-503, 3 figs. Lists equipment of power house including boilers, turbo-generators, pumps, converters, electric machinery; boilers use pulverized coal or blast-furnace gas; describes operation methods and gives information obtained during year's run.

Steel Mills. Waste Fuel and Power Interchange Cheapens Steel Mill Power, G. Fox. Power, vol. 67, no. 1, Jan. 3, 1928, pp. 19-25, 8 figs. Average output ratio of 85 per cent maintained in 10,000-kw. plant of Central Alloy Steel Corp. by power-interchange arrangement; built at cost of $100 per kw.; fuel, operating and maintenance expense less than 3 cents per kw-hr.; turbine generator uses all blast-furnace gas at periods of maximum availability; at other periods deficiency is made up from supplementary fuels; plant has six boilers, each with 8900 sq. ft. of heating surface and equipped with integral economizer of 4600 sq. ft.

PRESSURE VESSELS

Welding. Procedure Control in Pressure Vessel Welding, H. E. Rockefeller. Boiler Maker, vol. 22, no. 12, Dec. 1927, pp. 346-348, 4 figs. Design of vessel for 300-lb. pressure; selection and preparation of material; oxyacetylene welding of longitudinal seams and reinforcing rings. Paper presented at Int. Acetylene Assn.

PROTECTIVE COATINGS

Types and Processes. The Protection of Metals (La protection des metaux). Technique Moderne, vol. 20, no. 1, Jan. 1, 1928, pp. 52-53, 3 figs. Paints, varnishes and machines for depositing paints on surfaces, metallic coatings, by immersion in bath, galvanizing and its apparatus, chemical processes.

PULVERIZED COAL

Burners. A New Pulverized Fuel Burner. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 288-289, 1 fig. In new Lopulco design, fuel and air within burner are deliberately segregated; design is not influenced by any arrangement of external piping, and it operates with low air pressure; suitable for every type of boiler and also for general furnace work.

Short-Flame Pulverised Fuel Firing. Colliery Guardian, vol. 135, no. 3493, Dec. 9, 1927, pp. 1430-1431, 1 fig. Describes new "R" burner of International Combustion, Ltd.; with enormous throughput, up to 150,000,000 B.t.u., 6 tons of coal per single burner per hour, flame is complete in 10 ft. only instead of 30 ft.; burner is of "turbulent" type, but on new and improved principles.

Utilization. Pulverized Coal in a Large Power System, T. E. Purcell. Combustion, vol. 18, no. 1, Jan. 1928, pp. 41-45, 5 figs. Discussion of successive developments in use of pulverized fuel in plants of Duquesne Light Co., and of results obtained with this method of firing; interesting comparison is made between service hours available with pulverized fuel and stoker units.

Pulverized Fuel for Power Stations, G. H. Lake. Elecn., vol. 99, no. 2586, Dec. 23, 1927, p. 783. Detailed results following year's experience at Derby, Eng. installation of new type of coal drier; low maintenance costs from English viewpoint.

Survey of the Present Use of Pulverized Fuel, P. Junkersfeld. Combustion, vol. 18, no. 1, Jan. 1928, pp. 31-35. Survey of growth in use of pulverized fuel for power-plant work; what has been accomplished and probable future tendencies; author feels that there will be increasing use of this method of burning fuel, and that further improvements may be looked for as result of studies now being made.

PULVERIZED LIGNITE

Utilization. Operating Experience with Firing Texas Lignite, W. Flowers. Combustion, vol. 18, no. 1, Jan. 1928, pp. 38-41, 5 figs. Comal station was one of pioneer plants to pulverize Texas lignite; article reporting operating experiences indicates that it has worked with smoothness, efficiency, and cleanliness.

PUMPING STATIONS

Reconstruction. Better Pumps Cut Operating Costs. Ry. Eng. and Maintenance, vol. 24, no. 1, Jan. 1928, pp. 7-10, 6 figs. Reconstruction of water-pumping station on C. & O. at Stevens, Ky., terminal; triplex pumps replaced by centrifugals, one direct connected and other belt driven from 2-cylinder oil engine at top of well which is 58 ft. deep.

PUMPS

Air Lift in Oil Fields. Principles of Air Lift As Applied to Oil Production, H. R. Pierce and J. O. Lewis. Oil Weekly, vol. 47, no. 6, Oct. 28, 1927, pp. 43-46 and 56-60. Reviews theory of air lift, elements of mechanical efficiency, collecting and analyzing evidence, pressure and volume of air, surface flow lines, gas-oil ratio, estimating compressor capacity.

PUMPS, CENTRIFUGAL

Axial-Flow and. Low-Lift, Axial Flow and Centrifugal Pumps, H. R. Lupton and J. H. W. Gill. Water and Water Eng., vol. 29, no. 347, Nov. 21, 1927, pp. 435–445, 17 figs. Construction and characteristics of axial and axial-radial pumps; development of method pursued in determining characteristics and losses, contrasting axial with ordinary centrifugal type; description of experimental plant being installed at Ferrybridge, Eng., and of tests it is hoped to carry out. Abstract of paper read before Brit. Assn.

Selection. Selection of Centrifugal Pumps. Can. Min. Jl., vol. 48, no. 52, Dec. 30, 1927, pp. 1054–1057, 6 figs. Selection for or application particularly to mining and milling industries; characteristics of pump suitable for drawing from Crowe tank and delivering to precipitation press; characteristics of pump suitable for mine drainage and unwatering.

PUNCH PRESSES

High-Speed. Bliss High-Speed Punch Press. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, p. 1034, 2 figs. Operates at 300 strokes per min.; any opening desired can be provided in bed to drop work straight through; working parts all on top; mechanical feeds of several types can be furnished; adjustment of roll relief independent of feed-stroke adjustment; feed arranged to operate either front and back or right and left across bed.

Nibbler. "Semco" Improved No. P-25 1/2 Press and Nibbling Machine. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, p. 1035, 1 fig. Improved model with 30-ton pressure capacity near bottom of stroke, nibbling table separate attachment of three parts, top table having lateral traverse; sheets 36 in. wide pierced in center; room for use of adjustable back gages; 3 in. up and down adjustment of slide; bed adjustable in height.

Safety Devices. Safety in a Press Shop. Am. Mach., vol. 68, no. 1, Jan. 5, 1928, pp. 12–13, 5 figs. Five halftones, illustrating some safety devices at work on presses of Westinghouse Elec. & Manufacturing Co.; brief description explains each device; forming die equipped with safety feed chute and air blow-off; vacuum lifting tool for feeding and removing sheet-metal disks; two-hand safety trip applied to foot press; machine with all rotating parts encased, and double hand lever; exhibit of damaged vacuum lift tools.

R

RADIATORS

Steam, Performance of. Effect of Enclosures on Direct Steam Radiator Performance. Univ. of Ill.—Bul., vol. 25, no. 8, Oct. 25, 1927, pp. 5–37, 21 figs. Investigation to determine effect of various types of present-day commercial radiator enclosures, shields, and covers on steam-condensing capacity of direct cast-iron radiator; factors studied were air inlets, air outlets, heights, and grilles.

RAILS

Steel. Means for Improving Steel Rails, Pilz. Metallurgist (Supp. to Engineer), Dec. 30, 1927, pp. 183–185, 6 figs. Abstract of article in Stahl u. Eisen, Oct. 1927, which is review of methods of improving rail steel by means of chemical composition and by heat treatment of rails, with special reference to processes of Sandberg, Neuves-Maison, Huette-Ruhrort-Meiderich and Maximilianshuette; for German State Railways elastic limit in compression of at least 45 kg. and preferably 50 kg. per sq. mm. is stated to be necessary for rail steel to carry engines of 25 tons axle weight.

RAILROADS

Repair Shops, Equipment. Time-Saving Devices in the Boston & Maine Railroad Shops, E. Sheldon. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1013–1014, 5 figs. Stand for use in assembling and aligning valve-rod guides, cross-heads and combination levers of Walschaert gear; mandrel for holding piston-valve spool while turning and stand for holding them in assembling; cradle and platform to handle flues to and from boiler.

Signals and Signaling. A New Method of Operating Semaphore Signals. Engineer, vol. 144, no. 3755, Dec. 30, 1927, pp. 745–746, 5 figs. Although system of operating semaphore signals was invented to meet and defeat predatory habits of Chinese bandits, it should prove interesting and useful under variety of normal conditions which will readily suggest themselves to railway signal engineers; system is invention of J. H. Williams.

New Haven Installs Modern Signaling. Ry. Age, vol. 83, no. 26, Dec. 24 (Section 1), 1927, pp. 1261–1262, 2 figs. Describes new installation of automatic-block color-light signals between Holmes, N. Y., and Derby Junction, Conn.; a.c. floating power supply system used; 465 volts; current purchased from commercial power companies.

Terminals. Canadian Roads Open Impressive Union Station at Toronto. Ry. Age, vol. 83, no. 26, Dec. 24 (Section 1), 1927, pp. 1243–1250, 10 figs. Plans and description of new Union Station containing post office, railroad offices, train concourse, waiting room, dining room, baggage room, etc.; front, 850 ft. long, 7 stories high, with two wings 250 ft. long, 4 stories high; Bedford limestone used.

Train Despatching. A New Train Despatching System, New York Central Lines, B. J. Schwendt. Ry. Gaz., vol. 47, no. 25, Dec. 16, 1927, pp. 753–762, 19 figs. This installation, first of its kind, and including many special features, enables train despatcher to control as well as direct train movements over 40 miles of track; description of block signals, power-operated points, despatcher's control board, and its manipulation; checking features and general rules for train operation; benefits of new system are noted.

RAILWAY MOTOR CARS

Diesel-Electric. Pioneering the Diesel Railcar. Oil Engine Power, vol. 6, no. 1, Jan. 1928, pp. 26–28, 4 figs. Diesel-electric railcar built jointly by New York Central Railroad and McIntosh and Seymour Corporation represents important American development in utilization of oil-electric drive for propulsion of self-contained passenger coach.

REFRIGERATING MACHINERY

Corrosion. Corrosion in the Refrigerating Industry, J. K. Roberts, H. O. Forrest, and R. P. Russell. Refrig. Eng., vol. 14, no. 6, Dec. 1927, pp. 173–182 and 187, 17 figs. A.S.R.E. corrosion committee presents draft of its final report; corrosion of iron, steel and galvanized steel in brine systems may be greatly reduced by addition of sodium dichromate to brine; disodium phosphate as corrosion retarder; comparison of dichromate and phosphate treatments; other materials as retarders in brine; corrosion in condenser systems and in salt water; heat-transfer measurements for paint coatings and rust films; recommendations for treatments and instructions for application.

REFRIGERATING MACHINES

Mercury - Compressor. A Hermetically Sealed Refrigerating Machine Using the Mercury Compressor, J. G. DeRemer and R. W. Ayres. Refrig. Eng., vol. 14, no. 6, Dec. 1927, pp. 169–172, 7 figs. Refers to paper published in Nov. 1926 issue of this journal and Mid-Nov. 1926 issue of Mech. Eng. (see reference in Eng. Index, 1926, p. 633), in which reference was made to application of mercury compressor to refrigeration in form of sealed rigid element having no internal moving parts, requiring no internal lubricant, and possessing other interesting features; present paper records recent advance made in this type of refrigerating machine.

REFRIGERATING PLANTS

Piping. Piping for Cold Storage Rooms, W. S. Huntington. Refrigeration, vol. 42, no. 6, Dec. 1927, pp. 54–56. Describes and tabulates sizes of piping used for brine and ammonia in cold-storage rooms.

REFRIGERATORS

Standardization. Engineering Standards for the Refrigerator Box. Refrig. Eng., vol. 14, no. 6, Dec. 1927, p. 183. Further steps toward standardization of refrigerators were discussed and planned at conference for this purpose held in Engineering Societies Building, New York, through offices of American Engineering Standards Committee.

ROLLING MILLS

Efficiency. Figuring Efficiency of Steel Mills, F. C. Smith. Iron Age, vol. 120, no. 26, Dec. 29, 1927, pp. 1781 and 1828. Method of calculating for rolling; allowing for lost time, cobbles, changing sections, etc.

Electric Drive. Frequency Converter Speed Sets for the Carnegie Steel Company, Upper Union Works, Youngstown, Ohio, G. P. Wilson. Iron and Steel Engr., vol. 4, no. 12, Dec. 1927, pp. 487–490, 6 figs. Describes electric-motor equipment to drive merchant mills; driving unit consists of main motor with frequency converter on same shaft and transformer; speed regulation is same as induction motor.

Sheet Mills. Mills of the Backed up Type Remove Cold Rolling Limitations, L. Jones. Iron and Steel Engr., vol. 4, no. 12, Dec. 1927, pp. 498–500. Explains types of backed-up mills; their advantages and reasons for adoption in rolling sheet metal; history of installation of backed-up mills and how they effected production.

S

SCREWS

Wood, Specifications for. United States Government Master Specifications for Screws, Wood. U. S. Bur. Standards—Circular, no. 140, Oct. 8, 1927, 8 pp. 1 fig. Material and workmanship; general requirements; detail requirements.

SEAPLANES

Racing. Tenth International Schneider Cup Seaplane Races in Venice (Das zehnte internationale Seeflugzeugrennen um die Schneider-Trophaee in Venedig), F. Grossblau. V.D.I. Zeit., vol. 71, no. 50, Dec. 10, 1927, pp. 1733–1742, 60 figs. History of Schneider Cup races, records established annually since 1913, review of 1926 meet; detailed descriptions of American, British and Italian 1927 competing seaplanes and their engines; description of races, possibilities revealed.

SHAPERS

Draw-Cut. Morton Special Heavy-Duty Draw-Cut Shaper. Am. Mach., vol. 67, no. 26, Dec. 29, 1927, pp. 1035–1036, 1 fig. For production machining of pole pads on cast-steel motor magnet frames; special chucking attachment for holding motor magnet frames; has 60 in. of cutting stroke, power horizontal and vertical feeds, automatic oiling.

STANDARDS

Engineering. Reports of Divisions to Standards Committee. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 113–128, 23 figs. Ball bearing radii, roller bearings, motor-coach batteries, storage-battery terminals, engine-testing forms, fan belts and pulleys, hood-ledge lacings, new S.A.E. steel, heat-treatment definitions, headlamp laboratory tests, vacuum-brake manifold connection, passenger-car bumper mountings, Woodruff key specifications, oil and grease-cup threads, rivet-cap specifications, taper-fitting tolerances, steering-gear connecting rods, round unslotted-head bolts, rims for low-pressure tires.

STAYBOLTS

Materials. Staybolt Material Compared. Iron Age, vol. 120, no. 26, Dec. 29, 1927, pp. 1785 and 1829, 2 figs. Two independent investigations on wrought iron, steel and alloy steels; conditions under which staybolts are used.

STEAM ACCUMULATORS

Electric. Utilization of Surplus Electric Power by Means of Heat Storage (Ausnutzung elektrischer Ueberschussenergie durch Waermespeicherung), E. Walder. Archiv. fuer Waermewirtschaft, vol. 8, no. 12, Dec. 1927, pp. 390–393, 7 figs. Possible uses of surplus electric power for hot-water storage; generating steam for industrial plants, hospitals, hotels, etc.; description of electric boiler and accumulator of women's hospital of Basel; thermal insulation; use of flue boilers for storing heat; acceptance tests.

Ruths. Operating Experience with a Ruths Accumulator in a Textile Plant (Betriebserfahrungen mit einem Ruthsspeicher in einem Textilbetrieb), H. Severin and Scupin. Archiv. fuer Waermewirtschaft, vol. 8, no. 12, Dec. 1927, pp. 369–374, 12 figs. Equalizing effect produced by installation of Ruths accumulator of 80 cu. m. capacity and 1 to 5 atmospheres pressure; piping connections and wasteful effect of incorrect piping connections; cost analysis showing that saving in coal alone will soon allow to write off cost of accumulator installation.

Ruths Accumulators for Electric Power Station Overloads. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 290–291, 2 figs. Some 330 of these accumulators are in operation, mainly in industries; by utilizing accumulator to cope with overloads in any projected extension of electric generating station, capital outlay necessary might be estimated at $30 to $35 per new kw. installed. Review of paper by Dr. Ruths before Soc. of German Elec. Engrs.

STEAM PIPES

Design. Notes on the Design of the Steam Pipe Network in a Power Station, W. Eccles. Metropolitan-Vickers Gaz., vol. 10, no. 176, Nov. 1927, pp. 259–263, 3 figs. Similarity of piping and electric cable systems; provision for increase in steam pressure, space required, different systems, auxiliary steam supply; economical layout, steam velocity and pressure drop effect on design.

Steel High-Pressure. High-Pressure Steam: Its Demands on Piping, A. L. Walker. Mech. Wld., vol. 82, no. 2137, Dec. 16, 1927, p. 448. Steel castings have to great extent replaced those of cast iron; gradually difficulties of obtaining homogeneous metal have been reduced; forged flanges are superior to cast ones; design of joints; metal used for nuts is usually a straight carbon steel; in author's opinion demands made by high-pressure steam call for no radical changes of design; rather do they push design along path which is right, but which hitherto manufacturers have not been forced to follow.

STEAM POWER

Heat Losses. Heat Losses from Fuel to Machine, R. E. Light. Eng. and Boiler House Rev., vol. 41, no. 6, Dec. 1927, pp. 278–280, 3 figs. Points out that only very small fraction of fuel-heat contents supplied to factory boiler is utilized as "work done" at machines; ultimate ratio of energy output at machines to input at grates is seldom more than 6 per cent; detailed losses for three classes of installation are considered.

STEEL

Alloy. See ALLOY STEELS.

Density. Density of Hot-Rolled and Heat-Treated Carbon Steels, H. C. Cross and E. E. Hill. U. S. Bur. Standards—Sci. Papers, no. 562, Oct. 11, 1927, pp. 451–466, 7 figs. Density values for commercially pure and electrolytic iron and series of carbon steels, varying from 0.09 to 1.29 per cent carbon; values are given for these steels when hot-rolled, when annealed, when quenched, and when quenched and tempered. Bibliography.

Fatigue. On the Fatigue of Steels for Springs, Axles and Rails, S. Ikeda. (Japan) Dept. of Railways—Bul., vol. 15, no. 11, Nov. 1927, pp. 1745–1774, 32 figs. (In Japanese.)

Heat Treatment. On a New Method of Quenching Steels in a High Temperature Bath, K. Honda and K. Tamuru. Am. Soc. Steel Treat.—Trans., vol. 13, no. 1, Jan. 1928, pp. 95–104, 7 figs. Method of quenching steels in hot media so that they may obtain troostitic or sorbitic structure directly, without tempering as is now done, after steel is water or oil-quenched; by using hot quenching media there is also little chance of quenching cracks being formed; structure of steel quenched in bath at about 930 deg. fahr. is sorbitic; mechanical properties are not inferior to those of steel quenched in water and then tempered.

Scrap, Melting. Cupola Melting of Steel Affected by Coke Properties, J. T. MacKenzie. Foundry, vol. 56, no. 1, Jan. 1, 1928, pp. 15–18, 1 fig. Deals with total carbon absorbed by steel scrap when melted with various cokes of unusual collection, well representative and containing extremes likely to be encountered; cupola used was manufactured by Whiting Corp., Harvey, Ill., with 27-in. shell; it is assumed that extent of carburization depends on purity and structure of coke; for carburization, coke should not be either extremely dense or extremely porous; neither too hard nor too soft, too heavy nor too light.

Cupola Melting with Special Reference to Value of Steel Scrap in Cupola Mixture, W. Dennison. Foundry Trade Jl., vol. 37, no. 593, Dec. 29, pp. 225–226, 5 figs. Writer claims that, although term "semi-steel" is justifiably derided by metallurgists, use of steel scrap in cupola mixture has beneficial influence on physical properties of resultant metal even when chemical composition gives no indication of such improvement; percentage of steel used to obtain best results will vary from 5% for lightest of castings to 40% for heaviest.

Stainless. Stainless Iron and Steels, J. B. Green. Welding Engr., vol. 12, no. 12, Dec. 1927, pp. 34–36, 2 figs. Study of corrosion-resistant steel alloys and how changes in composition affect working qualities; scope of this article is confined to description of stainless steels from standpoint of using them in welded articles of manufacture; analyses of various brands of stainless steels.

STELLITE

Uses. Two Metals Better Than One. Acetylene Jl., vol. 29, no. 6, Dec. 1927, pp. 241–243, 2 figs. Methods employed to weld stellite to oil-well drills by oxyacetylene process; advantages in oil-drilling work; reports of bits in practice and stelliting in oil-field shops; the wearing qualities of stellite and its fitness for this kind of work. Shows how saving is made by use of stellite bits.

STOKERS

Locomotive. How the Mechanical Locomotive Stoker has been Developed, W. Sperflage. Steam Coal Buyer, vol. 8, no. 6, Dec. 1927, pp. 40–42. Description of mechanical stoker operations such as crushing and distributing; economical limit of locomotive size justifying installation, maintenance charge and economy of operation cited in two cases; data on recent construction.

Mechanical. Some Characteristics of Modern Stokers and How the Requirements of Today Can Be Met to Advantage, F. H. Daniels. Steam Coal Buyer, vol. 8, no. 5, Nov. 1927, pp. 17–20, 5 figs. Kinds of mechanical stokers and what is required of stokers; capacity to respond to sudden demands; multiple-retort and duplex firing stokers described and advantages enumerated.

T

TAPS AND DIES

Efficient Use of. Securing Best Results in Tapping, A. L. Valentine. Machy. (N. Y.), vol. 34, no. 5, Jan. 1928, pp. 353–358, 10 figs. One of series of articles; table of tapping speeds for machine tapping of nuts with carbon-steel taps; method of holding taps and nuts while tapping; tapping with acme and square-thread taps; friction tap holders described with diagram; die chasers and threading dies; relation between root diameter of taps and tap-drill sizes explained with diagrams.

THERMODYNAMICS

Integrating Factors. Thermodynamic Integrating Factors, A. Press. Lond., Edinburgh and Dublin Philosophical Mag. and Jl. of Science, vol. 4, no. 26, Dec. 1927, pp. 1245–1249. Integrating factor and its consequent equation of state; gamma-ratio and adiabatic expansion; integrating factor for adiabatic expansion; results tending to show that to each particular path thermodynamically pursued by substance there corresponds distinguishing thermodynamic integrating factor.

TINNING

Castings. Tinning Cast and Malleable Iron Products, A. Eyles. Sheet Metal Worker, vol. 18, no. 24, Dec. 30, 1927, pp. 915 and 928. Brief article dealing with special procedure for cast and malleable iron; removal of persistent film or skin from surface of pickled castings necessary; preparation of hydrofluoric-acid solution for pickling; using niter cake bath; advantages of niter-cake solution for pickling; immersion in zinc-chloride flux and then in molten tin and precautions to be observed; need for tinning mixtures to be carefully selected and utilized.

TRACTORS

Varied Uses of. Tractor Meeting Deals with Uses. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp 108–112, 5 figs. Brief review of papers presented at Annual Tractor Meeting in Chicago; machines built to work with tractors; farm, lumbering and snow-removal work; varied tractor used in oil fields; industrial and military-tractor operations; tractor engineers following automotive practice; power farming in Pennsylvania; importance of power in potato growing; rapid increase in farm tractors.

TUBES, STEEL

Heat Treatment. The Effect of Heat Treatment on Cold-Drawn Steel Tubes, F. C. Lea. Engineering, vol. 124, no. 3232, Dec. 23, 1927, pp. 797–800, 16 figs. Experiments to determine effect of annealing at various temperatures on properties of cold-worked steel tubes and their relationship to fatigue range; compression and torsion tests; change of density by heat treatment; effect of repetition stresses; effect of gradually raising repeated stress.

W

WAGES

Bonus Systems. See BONUS SYSTEMS.

Payment Plans. Changing Piece-Work to Bonus Reduced Labor Cost and Increased Earnings, W. C. Hasselhorn. Mfg. Industries, vol. 14, no. 6, Dec. 1927, pp. 435–438, 6 figs. In packing department task-and-bonus plan displaced piecework and eliminated day work, cut unit labor cost 10 per cent and increased piecework earnings 5 per cent in cooperage shop new equipment permitted new occupational rates; bonus replaced piecework with 48 per cent reduction in labor cost, which will pay for machinery in year.

WATER POWER

Canada. Developing St. Lawrence River Power. Can. Engr., vol. 53, no. 23, Dec. 6, 1927, pp. 583–585. International feature of proposed power and navigation project; advantages of two-stage development; formation of ice and its effect in river; artificial control of Lake Ontario; canals between Lake St. Francis and Montreal.

Water Powers of Canada. Dept. of Interior, Canada—Water Resources Paper, no. 60, Nov. 1927, 90 pp., 40 figs. Review of general conditions in Canada; amount of power utilized and by what industries; review of provinces taking up developments by hydroelectric plants for central stations and pulp and paper industries and transmission of power; part played by government in investigating and administering, also legislation effecting water power.

WATER PURIFICATION

Locomotives. The Treatment of Water for Locomotives, W. Barr and R. W. Savidge. Am. Water Wks. Assn.—Jl., vol. 18, no. 6, Dec. 1927, pp. 728–736. Discusses softening to remove scale-forming salts; boiler compounds; use of soda ash, zeolite treatment; lime-soda softener; use of sodium aluminate; methods of applying chemicals; Excelsior filter; horizontal-type water softeners; pitting corrosion and foaming.

WELDING

Aircraft. Principles of Aircraft Welding, P. N. Jansen. Acetylene Jl., vol. 29, no. 6, Dec. 1927, pp. 238–240, 5 figs. Methods used by Curtiss Airplane and Motor Co. are described with types of joints and personnel of welders. Strength of welded joints discussed and welding tools used. How uniformity and close limits are obtained.

Welding in Airplanes. Aviation, vol. 23, no. 26, Dec. 26, 1927, pp. 1522–1525, 9 figs. Abstracts from paper presented by R. M. Mock at 1927 International Acetylene Assn. Convention; wing with welded steel spars; welded steel tail surfaces; fuselages welded; future possibilities.

[See also AIRPLANES, Welding.]

Cast-Iron Pipe. See CAST-IRON PIPE, WELDING.

Electric. See ELECTRIC WELDING MACHINES.

Processes and Uses. Welding in Mechanical Construction (La soudre autogène dans la construction mecanique), E. Delamarre. Technique Moderne, vol. 20, no. 1, Jan. 1, 1928, pp. 41–48, 27 figs. Treats of various processes of welding and their application; blowpipe, electric-arc, electric resistance; material necessary for various processes; net cost of welding; charts giving costs of various welding methods.

WIRE

Manufacture. The Manufacture of Steel Wire, G. A. Alder. Iron and Coal Trades Rev., vol. 115, no. 3120, Dec. 16, 1927, pp. 891–892. Patenting; prevention of decarburization in patenting process; passage of wire through galvanizing bath; overdrawing not usually cause of failure. (Continued from Dec. 9.) Paper read before Cleveland Instn. Engrs.

WOOD

Waste Utilization. Utilization of Wood Waste and Wood Preservation (Die Verarbeitung des Holzes auf chemischem Wege: Holzabfall-Verwertung und Holzkonservierung), C. Schwalbe. Zeit. für angewandte Chemie, vol. 40, no. 42, Oct. 20, 1927, pp. 1172–1176. Discusses utilization of foliage, bark and heart for production of chemicals, war-time fodder, etc.; carbonization of wood; production of sugar and alcohol, cellulose, wood compositions and artificial fibrous materials; preservation of structural timber by impregnation with chemicals.

WORKMEN'S COMPENSATION

Social Insurance and. Workmen's Compensation and Social Insurance. Monthly Labor Rev., vol. 25, no. 3, Sept. 1927, pp. 84–89. Survey of industrial group insurance; report of industrial commission of Georgia; family endowment in New South Wales; widows', orphans', and old-age contributory pensions in Scotland; report of South African old-age pensions commissions.

THE ENGINEERING INDEX

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AERIAL TRANSPORTATION

Freight. Freight Airplanes (Frachtflugzeuge), A. Muller. Luftfahrt, vol. 31, no. 24, Dec. 22, 1927, pp. 371–372, 1 fig. General discussion of specific engineering features of freight transportation by airplane as distinguished from passenger transportation; tonnage statistics of freight, passengers and mail transported by airplanes in Germany during April to September months of 1925, 1926 and 1927, showing continued progress.

AIR COOLERS

Design. Graphical Methods for the Design of Air Coolers and Similar Apparatus (Graphische Berechnung von Luftkuehlern und aehnlichen Apparaten), W. Sell. Gesundheits-Ingenieur, vol. 51, no. 1, Jan. 7, 1928, pp. 5–8, 7 figs. Theory of design; graphical solutions of formulas derived; numerical examples; air-cooler characteristics; application of same graphical methods to design of air heaters, economizers, etc.

AIR PREHEATERS

Design. Design and Dimensions of Air Preheaters (Berechnung und Bemessung von Luftvorwaermern), W. Gumz. Feuerungstechnik, vol. 16, no. 1, Jan. 1, 1928, pp. 1–5, 5 figs. Computation of dimensions of an air preheater for boiler of 200 sq. m. heating surface and air temperature of 200 deg. cent.; general theory of relation between heating surface and velocity of gases, length and width of gas duct, initial and operating costs, etc.; dimensioning of heat exchangers.

Types. Air Preheaters for Boiler Furnaces (Les réchauffeurs d'air pour foyers de chaudières). Génie Civil, vol. 92, no. 3, Jan. 21, 1928, pp. 63–67, 12 figs. Classifies air heaters and describes and discusses values of each; comparison of three different types showing preference for heaters with parallel plates instead of tubes.

Preheated Air for Boiler Furnaces, P. H. N. Ulander. Eng. and Boiler House Rev., vol. 41, no. 7, Jan. 1928, pp. 332–335, 3 figs. Relative cost of preheater installation designed for an efficiency varying between 30 to 70 per cent, and cost per 1 per cent of fuel saving effected by preheater; presents curves referring to regenerative type of preheater; temperature of preheated air. (Continuation of serial.)

AIRPLANE ENGINES

Fuel Sprays, Testing. The N.A.C.A. Photographic Apparatus for Studying Fuel Sprays from Oil Engine Injection Valves and Test Results from Several Researches, E. G. Beardsley. Nat. Advisory Com. for Aeronautics—Report, no. 274, 1927, 14 pp., 12 figs. Start, growth, and cut-off of oil sprays recorded; high-tension transformer for charging bank of condensers to high voltage; electric sparks produced to illuminate moving spray for photographing; sprays injected into chamber containing gases at pressures up to 600 lb. per sq. in.; effects of injection pressure, chamber pressure, specific gravity of fuel oil used, and injection-valve design, upon spray characteristics.

Lorraine. The New Lorraine Air-Cooled Engines (Les nouveaux moteurs Lorraine réfroidis Par l'air). Aéronautique, vol. 9, no. 103, Dec. 1927, pp. 374–375, 9 figs. Description and main features of new 7-cylinder air-cooled Lorraine engine 230 hp., and 14-cylinder 470-hp. engine.

Water-Cooled. Water-Cooled Aero Engines, A. A. Rubbra. Royal Aeronautical Soc.—Jl., vol. 32, no. 205, Jan. 1928, pp. 77–85, 9 figs. Water-cooled Rolls-Royce engines and constructional details; power and weight; increasing loading factor on bearings; reduction gears; auxiliaries; cooling system; 3-point engine suspension; simplified controls; fuel system; starting systems; supercharging; gear-driven blower.

Wright Whirlwind. Wright "Whirlwind" a High Achievement in Engineering, F. L. Faurote. Iron Age, vol. 121, no. 6, Feb. 9, 1928, pp. 394–397, 4 figs. Crankshaft is chrome-nickel steel forging; details of lubricating system; air heater operated from pilot's cockpit; direct cost of operation less for four cents per mile; presents transverse-section drawing of engine.

AIRPLANE PROPELLERS

Metal. Fairey Airscrews and the Schneider Trophy Race. Aeroplane, vol. 34, no. 1, Jan. 4, 1928, p. 16, 3 figs. Description of Fairey metal airscrew; important speed races since 1923 won by machine fitted with this type of airscrew; thin-blade section; aerodynamic efficiency does not fall off at very high wind speeds; designing airscrew for last Schneider race; 4 types for each of engines (geared and ungeared), and best selected by trial; first to give maximum possible efficiency without regard to airplane interference; 3 others designed by varying characteristics of original ideal screw; better suited for direct-drive engines than those of geared type.

Testing. A New Type of Combined Airscrew Hub Dynamometer and Thrust Meter, F. E. Hellyer. Royal Aeronautical Soc.—Jl., vol. 31, no. 204, Dec. 1927, pp. 1150–1168, 19 figs. Designed to measure resultant force upon its hub of forces due to airscrew's torque and thrust; measurement of airscrew efficiency and engine horsepower method of applying force; experiments with model; friction between propeller boss and shaft on which it slides; friction between driving faces and rollers; experiments with model torque-thrust meter; finding brake horsepower.

AIRPLANES

Avimeta. Two New French Civil Machines. Aeroplane, vol. 34, no. 1, Jan. 4, 1928, pp. 12 and 14, 4 figs. Features of two all-metal Avimeta planes; constructed throughout of Alferium, similar to duralumin; Avimeta 92 is single-engined monoplane designed to take 230-hp. air-cooled Salmson 9 A.B., 220-hp. Wright Whirlwind or other 200-hp. engines; cabin for 4 passengers; wing built in one piece attached directly to top of fuselage and braced by two pairs inclined struts; maximum speed of 120 m.p.h.; undercarriage of split type; Avimeta 132 is 3-engined machine; cabin seats 10 passengers; two wing engines suspended below junction of wing struts and wing on tubular framing; specifications for both planes.

Bellanca. The New Bellanca Monoplane, R. M. Mock. Aviation, vol. 24, no. 4, Jan. 23, 1928, pp. 194–197, 4 figs. Design features of Models J and CH; first of series of closed cabin monoplanes powered with Whirlwind engine; externally braced wood wings covered with fabric do not taper; speed 130 m.p.h.; landing speed, 44 m.p.h.; carrying load, 1100 lb.; fuselage of welded chrome molybdenum steel built in two units; Model J, fitted for long distance flight, has no door to cockpit; dual side by side control; rubber shock-absorber chord; original cantilever landing gear; manufacturer's specifications.

Brown Mercury. Brown Mercury Monoplane, C. F. McReynolds. Aviation, vol. 24, no. 3, Jan. 16, 1928, pp. 142–144, 5 figs. City of Angels, light 3-place plane powered by 360-hp. Anzani engines; high speed of 120 m.p.h.; fuselage of welded steel-tube construction, wire braced; wing structure of wood; all tail surfaces of welded steel tube; undercarriage of Fokker type; open cockpit; wound rubber cord shock-absorbing unit extending from each wheel to lower fitting of engine mount; outboard engine

Note.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

mounting; wing in 3 sections; 3 gas tanks of 26 gal. capacity, carried in center section; wing curve known as Brown no. 5; specifications and performance figures.

Design. In the Drawing Office—Some Notes on the Assembly of Wings, W. S. Hollyhock. Flight (Aircraft Engr.), vol. 19, no. 52, Dec. 29, 1927, pp. 880d–880e, 1 fig. Importance of combination of angles due to sweepback, dihedral, airfoil incidence and spar incidence briefly dealt with; errors small, but might cause structural failure; in case of sweepback, effect of spar incidence if neglected may upset fore-and-aft trim of machine, by giving incorrect amount of sweepback when erected; formula arranged to correct effects.

Dornier. The New Dornier "Super-Wal." Flight, vol. 20, no. 2, Jan. 12, 1928, p. 18, 1 fig. Description of new Dornier Super-Wal for carrying 20 passengers; 4 Gnome-Rhone Jupiter 480-hp. geared engines; boat hull of duralumin; monoplane wing with steel spars, duralumin ribs and covering; top speed of 136.5 m.p.h. claimed; cabin for 12 passengers and aft cabin with room for 8 passengers; dual controls; wireless compartment on starboard side; total fuel capacity of 792 gal.; fuel tanks in hull; probably pressure feed; engines in 2 tandem pairs some distance out on top of wing; fitted with Farman type of reduction gear.

Fokker. Two-Engined Transport Fokker F VIII (Le bimoteur de transport Fokker F VIII). Aérophile, vol. 36, nos. 1–2, Jan. 1–15, 1928, p. 22, 1 fig. 15-Passenger, 2-pilot, monoplane with 2 engines; specifications; engines are Jupiter Gnome and Rhone, series IV, V or VI; speed, 200 to 210 km. per hr.

Koolhoven. The New Koolhoven Light 'Plane. Flight, vol. 20, no. 2, Jan. 12, 1928, p. 19, 1 fig. Describes F.K. 30 Toerist with Siemens engine; parasol pusher semi-cantilever monoplane; turntable, secured to fuselage structure just below engine, supports whole superstructure; by undoing quick-release turntable can be rotated, bringing wing into fore-and-aft position with engine outboard; 2 seats in tandem with dual controls; narrow and shallow rear portion of fuselage; gasoline tanks in wing; engine entirely exposed; pilot, passenger, 90 lb. of luggage, and 5 hrs. fuel carried; machine packing case constructed to be used as hangar and workshop.

Materials, Mechanical Properties of. Mechanical Properties of Some Materials Used in Airplane Construction, E. B. Wolff and L. J. G. Van Ewijk. Nat. Advisory Com. for Aeronautics—Tech. Memorandum, no. 448, Jan. 1928, 17 pp. Results of test to determine mechanical properties of aircraft materials; aluminum and its alloys, steel, wood and fabrics tested; tables of strength ratios; ratio between allowable stress (tensile or compressive) and specific gravity; figures for spruce, pine, and 3-ply wood, merawan, Carolina pine, walnut and mahogany; exceptionally low specific gravity and favorable D/S. G. ratio of balsa. Translated from Ingenieur, Aug. 7, 1926.

Performance Calculation. Calculating the Performance of Airplanes (Leistungsberechnung von Flugzeugen), E. Everling and H. Mueller. Zeit. fuer Flugtechnik und Motorluftschiffahrt, vol. 18, no. 24, Dec. 28, 1927, pp. 561–566, 13 figs. Collection of formulas, charts, nomograms and tables for computing speed, angular velocity, ceiling height, minimum radius of curvature of path, etc., from such data as weight, wing area, motor characteristics, propeller efficiency, etc.

Seaplanes. See SEAPLANES.

Sikorsky Bomber. The Sikorsky "Guardian." Aviation, vol. 24, no. 3, Jan. 16, 1928, pp. 148–150, 5 figs. All-metal night bomber features; structurally similar to Ville de Paris; powered with two 525-hp. Hornet engines; open-section duralumin used; lower wing somewhat shorter than upper; speed of 128 m.p.h. with landing speed of 57 m.p.h. carrying full load of 14,650 lb.; adjustable fin eliminated and rudders enlarged; crew of five; machine guns; 2 instrument boards; combination oleo and rubber shock absorber; disposition of loads makes it adaptable to commercial transportation.

Wheels. Design of Airplane Wheels (Il calcolo delle ruote degli aeroplani), G. A. Aldo Guglielmetti and L. G. Ferrari. Rendiconti Tecnici della Direzione Generale del Genio Aeronautico, vol. 15, no. 5, Dec. 1927, 12 pp., 5 figs. Mathematical analysis, backed with experimental research, of stresses in airplane wheels; diagrams for design.

Zenith. The Zenith "Albatross." Aviation, vol. 24, no. 5, Jan. 30, 1928, pp. 258–260, 6 figs. Details of new large parasol monoplane powered with three 125-hp. Siemens-Halske engines; semi-cantilever, externally-braced wing of 90 ft. spread; 14 passengers and baggage carried at maximum speed of 100 m.p.h.; landing speed 25 m.p.h.; Gottingen 398 wing section used; fuselage of welded-steel tubing; engine nacelle covered with duralumin on forward section and fabric over rear; fuel fed by gravity from wing tanks, pump supplying wing tanks from main tank in cabin; manufacturer's specifications.

AIRSHIPS

Hull Stresses. Secondary Stresses in Airship Hull Structures, J. F. Baker. Royal Aeronautical Soc.—Jl., vol. 31, no. 204, Dec. 1927, pp. 1073–1109, 13 figs. Calculation of secondary stresses due to distribution of external longitudinal loads; secondary stresses due to continuity of longitudinals; appendix A gives extract from Influence du Système de Triangulation sur les Efforts Secondaires, Z. Bazant; appendix B gives detailed calculations of loads due to primary and auxiliary systems; 11 line cuts demonstrating moments and 23 tables of tangential and radial auxiliary systems.

Zeppelin. The Zeppelin Airship "L.Z. 127" (Vom "L.Z. 127"). Luftfahrt, vol. 31, no. 24, Dec. 22, 1927, pp. 375–377, 2 figs. Data on airship in course of construction at Friedrichshafen, which is to have cruising radius of 10,000 km.; will accommodate 20 passengers and crew of 24 and will carry 15 tons of cargo; designed to be 235 m. long, 30.5 m. in diameter, and will be equipped with five Maybach engines, 2650 hp. total power, insuring speed of from 117 to 128 km. per hour.

ALLOY STEELS

Heat-Resisting. Heat-Resisting and Non-Corrodible Steels, S. A. Main. Fuel, vol. 7, no. 1, Jan. 1928, pp. 4–20, 17 figs. Account of progress which has taken place lately, including development and practical application of heat-resisting and non-corroding steels; deals particularly with products resulting from research carried out by author's firm, Hadfields, Ltd., Sheffield, England. Reprinted from Jl. of Instn. of Aeronautical Engrs., Aug. 1927.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bearing Metals. See BEARING METALS.

Magnesium. See MAGNESIUM ALLOYS.

Temperature Effect. On the Influence of Temperature on the Properties of Alloys, J. Cournot. Information on Refrigeration (Institut Int. du Froid)—Monthly Bul., no. 9–10, Sept.-Oct. and Oct.-Nov. 1927, pp. 873–874. Author summarizes present state of knowledge on variations of properties of alloys and practical consequences therefrom; study of these variations is made by means of test tubes of alloys considered, by bringing these tubes to temperatures required and determining by appropriate tests values of properties sought for. Translated from Revue Scientifique, no. 19, 1927, pp. 589–595.

ALUMINUM ALLOYS

Properties. Production and Industrial Applications of Aluminum Alloys (Die technische Herstellung und Verwendung von Aluminium-Legierungen), v. Zeerleder. Schweizerische Bauzeitung, vol. 91, no. 3, Jan. 21, 1928, pp. 27–30, 8 figs. World's aluminum production for period of 1903 to 1927 and statistics of aluminum exported from Switzerland for period of 1907 to 1927; chemical composition and mechanical properties of duralumin, anticorodal, and other aluminum alloys; improving aluminum alloys by heat treatment and other method; uses of aluminum alloys in electric transmission.

Sand-Cast. Influence of Soda Additions on the Strength of Aluminum-Copper Alloys (Sand-Cast Aluminum) [Ueber der Einfluss von Natriumzuschlaegen auf die Festigkeitseigenschaften von Aluminium-Kupfer-Legierungen (Aluminium-Gusslegierungen)], F. Goederitz. Giesserei, vol. 15, no. 3, Jan. 20, 1928, pp. 55–61, 18 figs. Investigates influence of different soda additions on strength elongation, notch strength, hardness and grain size of aluminum-copper alloys 96:4, 92:8, 80:20 and 68:32; it is shown that sodium in general has deteriorating effect on all mechanical properties; includes photomicrographs.

AMMONIA COMPRESSORS

Control Valves. Automatic Ammonia Control Valves, H. C. Venemann. Power, vol. 67, no. 4, Jan. 24, 1928, pp. 148–151, 3 figs. Discusses shortcomings of existing automatic control valves and outlines plant conditions that influence operation of such expansion valves; there are four types of automatic control valves in common use: Stop valves, to open and close quickly; constant-pressure valves, to maintain definite suction pressure; constant liquid-level valves, to keep liquid in evaporators at definite level; and load-demand valves, to control liquid supply in proportion to load demands upon evaporator.

Rotary. The Most Powerful Refrigerating Machine in the World (La plus puissante machine frigorifique du monde), R. Villers. Nature (Paris), no. 2777, Jan. 15, 1928, pp. 66–68, 5 figs. Describes rotary ammonia compressor; scheme of operation; built by Brown-Boveri for Kaiseroda works in Germany; delivers 8 million frigories per hour if temperature of liquefaction falls to 25 deg. cent.

Volumetric Efficiency. Is Volumetric Efficiency Important? T. M. Gunn. Power, vol. 67, no. 6, Feb. 7, 1928, pp. 255–257, 2 figs. Shows importance, from certain viewpoints, of volumetric efficiency of ammonia compressors and its lack of importance from other viewpoints; factors that influence volumetric efficiency are enumerated and explained; each factor is linked up with its influence on operating factors of efficiency; namely, output of machine in terms of refrigerating effect and input in terms of power; presents ammonia-compressor diagram and diagram showing where losses occur in compressor.

AMMONIA CONDENSERS

Heat Transfer in. Heat Transfer in Ammonia Condensers, A. P. Kratz, H. J. MacIntire and R. E. Gould. Univ. of Ill.—Bull., vol. 25, no. 15, Dec. 13, 1927, 56 pp., 30 figs. Also (conclusions) Refrig. Eng., vol. 15, no. 2, Feb. 1928, p. 56, 1 fig. Investigation to determine coefficient of heat transfer for various types of condensers, regarding total surface exposed to saturated ammonia vapor as whole; it was also desired to obtain information on relative effectiveness of different portions of cooling surface and to develop both optimum and limiting conditions of operation for types considered.

ARTILLERY

Anti-Aircraft. Observing and Plotting Hits for Anti-aircraft Artillery, G. B. Welch. Coast Artillery Jl., vol. 68, no. 1, Jan. 1928, pp. 4–13, 6 figs. Describes method of observing and plotting based on two terrestrial observation stations located at either end of measured base line; instrument used to make observations is important; suitable instrument has been improvised in 61st Coast Artillery; modification sacrifices, to some extent, accuracy for simplicity, but is probably as accurate as data which must be used.

AUTOMOBILE ENGINES

Cylinders, Casting. Aluminum Cylinder Blocks Cast in Permanent Molds, J. A. Lucas. Am. Mach., vol. 68, no. 4, Jan. 26, 1928, pp. 173–174, 6 figs. Method used in Lancia plant for casting cylinder blocks around cylinder sleeves and other inserts; cylinders staggered, and have iron sleeves cast into aluminum block by use of permanent metal molds; oiling tubes welded into complete unit and placed in mold; sleeves, rough bored, turned, then sand blasted and copper plated before being set in molds, are temporarily located on pilots and handled by insides; cores located accurately by dowels.

Design. Increase in Engine Power Among Chief Trends of Year, P. M. Heldt. Automotive Industries, vol. 58, no. 2, Jan. 14, 1928, pp. 45–49, 8 figs. New design features of new models; strong swing toward aluminum pistons; dual valve springs; vibration dampers; engine outputs stepped up by increasing piston displacement, increasing compression ratio, and in eight-cylinder vertical engines by dual carburetors and dual manifolds; improvement on Lanchester vibration damper; roller chain front-end drive; metric thread spark plugs; crankcase ventilation; evaporation cooling; four-speed transmissions.

Detonation. Mechanical Design and Detonation, H. R. Ricardo. Automobile Engr., vol. 18, no. 237, Jan. 1928, pp 23–24. Question of detonation in its relation to engine design; what could be done in way of performance considered if detonation were non-existent; advantages and disadvantages of raising compression ratio; tendency to detonate depends upon four design factors; influence of turbulence upon detonation; effect of cylinder size on detonation. Paper presented to Instn. Petroleum Technologists.

Diesel. See DIESEL ENGINES, Automotive.

AUTOMOBILES

Amilcar. The 12 Hp. Supercharged Amilcar "Six." Auto-Motor Jl., vol. 33, no. 1, Jan. 5, 1928, pp. 11–13, 8 figs. Distinctive features of low sports two-seater model; two overhead camshafts; simple supercharging system; 24 miles to gallon; 105 m.p.h.; engine 3-point suspended; cylinder bore 57 mm., and displacement 1094 cc.; shaft carried in 7 bearings;

aluminum pistons; detachable cylinder head; dry-pump-system lubrication; A. C. oil filter; Hartford shock absorbers; wheels wire detachable; internal-expanding 4-wheel brakes.

Ascot. The Ascot Car. Auto-Motor Jl., vol. 33, no. 2, Jan. 12, 1928, pp. 29–31, 8 figs. Design features of 10-hp. vehicle of unique construction; welded steel plates used instead of castings for engine, gear and frame; box-section frame; low power-weight ratio; cylinder barrels of mild steel turned from solid and welded into sheet-steel water jacket and to sheet-steel crankcase; 4 cylinders with bore of 63 mm. and stroke of 110 mm.; full-pressure lubrication system; single-plate clutch; rear axle of full-floating type; fuel consumption of about 40 miles to gallon.

Cyklon. The Cyklon Six. Automotive Abstracts, vol. 6, no. 1, Jan. 20, 1928, p. 10. New 9/40-hp. 6-cylinder car is German attempt to compete in price as well as in quality with America; shows very easy 4-wheel brake regulation by outside wing screw; production of car is not conveyorized, but thoroughly up-to-date; quantity-production machine tools have been installed. Brief translated abstract from Motor (German), Nov. 1927.

Graham-Paige. Low Variation of Torque a Feature of Graham-Paige Small Six. Automotive Industries, vol. 58, no. 4, Jan. 28, 1928, pp. 124–125, 2 figs. Description of Model 610; fluctuation only 11.3 per cent between 7$^1/_2$ and 46 m.p.h.; compression ratio 5.43 to 1; engine develops over 50 hp. at 3200 r.p.m.; 7-bearing crankshaft with interchangeable main bearings; aluminum-alloy pistons with invar strut; pressure lubrication; hydraulic 4-wheel brakes; Hexdee shock absorbers; adjustable brake and clutch pedals; ball thrust bearings in steering spindles; engine of L-head design.

Headlights, Specifications for. Draft of Specifications for Laboratory Tests of Optical Characteristics of Electric Headlamps for Motor Vehicles. Illum. Eng. Soc.—Trans., vol. 23, no. 1, Jan. 1928, pp. 17–22. Definitions; samples for test; incandescent lamps; set-up for testing; photometric test points; focal adjustments of incandescent lamps; dual-beam headlamps designed for 21–22 candlepower incandescent lamps; fixed-beam headlamps designed for 21-candle-power incandescent lamps.

Manufacture, Ford. Ford Production Methods. Machy. (Lond.), vol. 31, no. 794, Dec. 29, 1927, pp. 413–415, 7 figs. Commutator roller head produced by series of press operations from 14 B.W.G. sheet steel; three forming operations to give roller head its shape;. first bending tools for roller head; blanking tools; press operations; after forming, roller head swaged; operations on roller clevis; punching and piercing operations.

Operations on the New Ford Car—Progressive Assembly in the Fordson Plant. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 464–465, 8 figs. Eight halftones illustrating assembling operations on new Ford car, each accompanied by brief description; individual units separately assembled and tested, ready for final assembly; assembling of clutch; engine assembly; gas-fired annealing furnace with automatic timing control for differential ring gears; fitting pistons to engine; all operations performed along assembly line as chassis proceeds; chassis completely assembled.

Manufacture, Inspection. Ford Inspection Methods. Machy. (Lond.), vol. 31, no. 796, Jan. 12, 1928, pp. 473–475, 7 figs. Principles involved in rigid Ford system of inspection; gages for camshaft connecting rods and piston rings; true running of camshaft checked by dial indicator; hardness test on cams and bearing surfaces; camshaft assembled with timing wheel and assembly itself checked; pistons checked on all diameters and for outside diameter passed through sleeve-type ring gages; elaborate set of gages for inspection of piston rings; gage to test stiffness or spring of piston ring electrically operated.

Manufacture, Italy. Roughing Lancia Sleeves, J. A. Lucas. Am. Mach., vol. 68, no. 2, Jan. 12, 1928, pp. 45–46, 4 figs. Method of preparing iron sleeves to be cast in aluminum cylinder block; machining operations on sleeves and method of holding; upper surfaces are milled at opposite angles on two sleeves, so that when assembled in mold all four sleeves will present a flat surface on top of mold; milling angular clearing space at bottom of sleeve.

Springs and Suspension, Design of. Spring Problems in the Design of Fixed and Free Rear Axles (Federungsprobleme bei starren und schwingenden Hinterachsen), E. Marquard. Motorwagen, vol. 30, no. 36, Dec. 31, 1927, pp. 755–761, 29 figs. Conclusion of paper on axles and axle shock; Benz experiments and development of Rumpler free axle, description of Rumpler, Tatra, Steyr, etc. front and rear axles, transmissions, differentials, axle suspensions, etc., Daag motorbus and Faudi air springs; the Faudi combined pneumatic and mechanical brake.

B

BALANCING

Rotating Parts. Balancing Rotating Parts by a New Method, C. O. Herb. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 466–469, 5 figs. Description of Olsen-Lundgren process in which amounts and angular locations of unbalance in part are determined without rotating work at critical speed; crankshafts of all passenger cars balanced statically and dynamically before assembled into engines; advantages derived from balancing; determining static and dynamic unbalance; machine construction; procedure in balancing part; measures pressure of centrifugal force caused at each bearing support by unbalanced condition in piece being tested.

Field Balancing Rotors at Operating Speed, G. B. Karelitz. Power, vol. 67, no. 6, Feb. 7, 1928, pp. 237–240, 5 figs. First of two articles describing method for determining location and size of weights necessary for balancing rotors at their operating speed; forces acting to cause vibration are analyzed; practical development work was carried out at South Philadelphia Works of Westinghouse Electric & Manufacturing Co.

BEARING METALS

Lead-Base. A Discussion of Lead Base Bearing Metal, G. A. Nelson. West. Machy. Wld., vol. 19, no. 1, Jan. 1928, pp. 12 and 25, 3 figs. Lead-base bearing metals as substitute for tin-base babbitt metal, but at much lower price; use in line shaftings and parts of machines that do not receive shocks; heated up to 1000 deg. fahr.; at definite intervals of time, temperature readings taken; time plotted against temperature; care to prevent segregation in pouring box of this metal; use of tin bearing for lower half of box and lead bearing for upper half.

BEARINGS

Alloy-Steel. Alloy Bearings Applied to Trains, F. C. Langenberg and C. McKnight. Iron Age, vol. 121, no. 2, Jan. 12, 1928, pp. 130–131, 3 figs. Very hard wearing surface after proper treatment and strength of core result in high resistance to shock and impact; possibility of obtaining fine core and hard case after single quench; heat-treated, it is applicable for high temperatures; alloys in scrap recoverable; chart showing physical properties of core of case-hardened nickel-molybdenum steel; single treatment; table of properties of heat-treated specimens tested at 74,600 and 1000 deg. fahr.

Oilless. Value of Oilless Bearings and their Manufacture (Die Bedeutung und Fabrikation der Oellos-Lager), H. Pfennig. Werkstattstechnik, vol. 21, no. 23, Dec. 1, 1927, pp. 683–686, 18 figs. Advantages of oilless bearings and conditions justifying their use; description of their construction, curve of permissible pressures and shaft speeds; number of examples illustrating applications in German shop practice.

BEARINGS, ROLLER

Steel Mills. Roller Bearings Cut Down Power Waste, S. M. Weckstein. Iron Age, vol. 121, no. 4, Jan. 26, 1928, pp. 259–262, 8 figs. Application of roller bearings to roll necks, pinion stands and hot saws in steel mills; roller bearings suited to roll necks, simple in construction and compact; advantages claimed; conditions for hot saws hard to meet; high speed of saw and sudden heavy-peak loads; high operating temperatures; bearing arrangements for various types of auxiliaries; hot-bed table rolls for strip mills.

BELTS AND BELTING

Quality Factors. Quality Factors of Leather Belts, R. C. Moore. Indus. Engr., vol. 86, no. 1, Jan. 1928, pp. 29–31, 4 figs. Life and operating reliability of leather belt depends to large extent upon selection and matching of leather strips used, as well as care exercised in its manufacture.

BLAST FURNACES

Blast Drying. The Silica Gel Blast-Drying Plant at Wishaw. Engineering, vol. 124, no. 3233, Dec. 30, 1927, pp. 836–837, 3 figs. Description of the silica-gel blast-drying plant as installed at Wishaw Works of Glasgow Iron & Steel Co.; method of manufacture and properties of silica gel.

Practice. Blast Furnace Developments in 1927, H. A. Berg. Blast Furnace and Steel Plant, vol. 16, no. 1, Jan. 1928, pp. 15–17. Although there have been no radical departures in furnace construction or in manner of handling furnaces, nevertheless many minor advances have been made; preparation, selection and handling of materials; thorough gas cleaning; hot-blast stoves; boiler installations.

BOILER FEEDWATER

Regulators. Feedwater Control Equipment. Power Plant Eng., vol. 32, no. 2, Jan. 15, 1928, pp. 117–120, 6 figs. Present-day demands require quicker response from feedwater regulators; types of regulators, their application and operation.

Softening. Sodium Aluminate as an Aid to Water Softening. Am. Ry. Eng. Assn.—Bul., vol. 29, no. 300, Oct. 1927, pp. 138–142. Use of sodium aluminate on the Rock Island lines; table showing additional savings resulting from use of sodium aluminate in lime and soda plants.

BOILER FURNACES

Linings. How to Avoid Failure in Monolithic Furnace Linings, J. L. Cummings. Power, vol. 67, no. 5, Jan. 31, 1928, pp. 175–177, 4 figs. Résumé of practical experience telling why same materials cannot be used for furnace linings and baffles, importance of thoroughly mixing and proportioning refractory and bonding material, with comments on compacting, drying and use of wooden forms and reinforcing metal.

Pulverized Coal in. Heating of Steam Boilers with Pulverized Coal (La chauffe des généreteurs de vapeur au charbon pulverisé), M. Emanaud. Technique Moderne, vol. 19, no. 24, Dec. 15, 1927, pp. 781–783, 7 figs. Treats of smoke-dust separators and ash arresters.

The Disposal of Grit from Boilers Fed by Pulverised Fuel, W. A. Smith. Elecn., vol. 99, no. 2587, Dec. 30, 1927, pp. 803–805, 5 figs. Station engineer's problem; soot blowers; pneumatic dust-extraction plants; grit catchers; installations for Lancashire boilers; dealing with existing plants; alternative to permanent extraction system; pneuconex; combined gravity and induction advantages; principal features of grit catchers.

Turbulence vs. Volume. Turbulence vs. Large Furnace Volume, L. W. Hayward. Power, vol. 67, no. 6, Feb. 7, 1928, p. 240. To obtain both time element for burning fixed carbon and turbulence for rapid mixing of products of conduction, furnaces should be large enough to provide necessary time element for burning fixed carbon, and burner should provide necessary turbulence for rapid mixing of gases; experience obtained in burning coal in pulverized form has demonstrated that turbulence is of importance, but that time element of combustion, which is determined by furnace volume, is of greater importance.

BOILER TUBES

Heat Transmission Through. Heat Transmission Through Boiler Tubes, H. O. Croft. Univ. of Ill.—Bul., vol. 25, no. 5, Oct. 4, 1927, 55 pp., 17 figs. Investigation to obtain heat transmission data under conditions similar to those existing in actual water-tube boiler and to study phenomena of water circulation under same conditions; conclusions drawn are that coefficient of heat transmission of apparatus is affected by: rate of gas flow; temperature difference between flue gas and water; pressure at which steam is generated; temperature of gas stream; water velocity in tube has slight effect on overall coefficient of heat transmission.

BOILERS

Design. Steam Generators at Morgan & Wright Plant, G. Burgess. Power Plant Eng., vol. 32, no. 3, Feb. 1, 1928, pp. 171–173, 2 figs. Flexibility, high evaporation and high heat liberation and compactness are characteristics of two 100,000-lb. per hr. units installed by industrial plant in Detroit; features incorporated include: full water-cooled combustion-chamber walls integral with circulatory system of generator, practical elimination of brickwork in furnace, water screen and tangential firing.

The Characteristics of Modern Boilers, E. R. Fish. Machy. Market, no. 1419, Jan. 13, 1928, pp. 21–22. Changes in shape and design due to use of higher pressures; more powerful fabricating equipment and greater care in methods of workmanship; moderate-size, moderate-pressure boilers in majority; furnace improvements; modern fuel-burning apparatus designed to use small amount of excess air; water walls must be carefully and properly designed and arranged; draft problems; details of boiler design considerably modified to accommodate superheaters sufficiently large to give desired temperatures; furnace-controlling systems.

Efficiency Diagrams. The Reflex-Ordinate Boiler-Efficiency Diagram. Power Engr., vol. 23, no. 262, Jan. 1928, p. 8. Presents diagram on supplementary plate based on Callendar's enlarged steam tables; drawn and designed by H. C. Golder and R. B. Page.

Heads. New Recommendation for the Shape of Dished Boiler Heads (Neuer Vorschlag fuer die Meridianlinie von Korbbogenboeden), G. Hoennicke. Waerme, vol. 50, nos. 48 and 49, Dec. 5 and 12, 1927, pp. 819–823 and 836–840, 7 figs. Author recommends a new meridian for basket heads and compares it with the Otte basket head which up to present time has been considered best shape; numerical calculation of new basket-head shape; geometrical study of basket heads.

Standardization of Dished Heads in Respect to Internal Pressure (Die Normung der gewoelbten Boeden Fuer Innendruck), E. Hoehn. Zeit. des Bayerischen Revisions-Vereins, vol. 31, no. 24, Dec. 31, 1927, pp. 263–265. Claims that question of unanchored dished heads in respect to ability to resist internal pressure will be definitely solved only when heads are standardized; standardization is considered according to width of heads, their depth, and shape of meridian tests show that stresses along meridian are more favorably distributed in elliptic than in basket-shaped head, and smaller stresses occur in flange.

Klingenberg Power Plant. Boilers of Klingenberg Power Plant (Die Kesselanlage des Grosskraftwerkes Klingenberg), F. Muenzinger. V.D.I. Zeit., vol. 71, no. 53, Dec. 31, 1927, pp. 1855–1868, 54 figs. Preliminary and final designs; letting of contract and execution by A.E.G., Borsig, Rota-Werke, Babcock, Hanomag, etc., of vertical tubular boilers of about 1800 sq. m. heating surface, economizers, preheaters, superheaters, etc., apparatus and methods of firing with pulverized coal; construction of boiler house chimneys, coal-pulverizing plant, equipment for electrical handling and conveying of pulverized coal.

Locomotive. See LOCOMOTIVE BOILERS.

Steam Generators. See STEAM GENERATORS.

Sulzer. The Sulzer 1500 lb. Boiler. Commonwealth Engr., vol. 15, no. 3, Oct. 1927, pp. 99–101, 1 fig. Describes boiler to carry 1565 lb. pressure; cross-section of boiler shown and table of tests given; plant at Winterthur, Switzerland.

BORESCOPES

Holz. Holz "Borescopes." Am. Mach., vol. 68, no. 2, Jan. 12, 1928, pp. 73–74, 3 figs. Device for examining inside surfaces of gun and rifle barrels, compressed-gas steel cylinders, metal tubes, hollow shafts and axles, and long borings in castings; long metal tube carries source of electric illumination and contains optical system, usually consisting of lenses, prisms, light filters and focusing eyepiece; slight structural difference clearly brought out; various types and applications.

C

CAMS

Machining. Machining a Cam Surface in a Drill Press, J. E. Fenno. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 447–448, 3 figs. Problems in machining switch-box control pad; two operations performed with fixtures of unique design; machining of cam surface and drilling and tapping of hole; to machine cam face, pad is placed in base of fixture bolted to drill-press table, concentric with drill-press spindle; short hub of pad on which cam surface is to be formed; first rough-faced with standard counterbore; drilling and tapping jig; jig used in machining cam surface; design of jig that can be quickly loaded and unloaded.

CARS, DYNAMOMETER

New. New Dynamometer Car, South African Railways. Ry. Engr., vol. 49, no. 576, Jan. 1928, pp. 27–29, 5 figs. Description of this car and its equipment recently introduced on South African Railways; car is 3-ft. 6-in. gage; underframes and body details; mechanism of instruments; measurement of car speed; ascertaining amount of work performed; other equipment.

CARS, FREIGHT

Repairing. Progressive Repairs to Hopper Cars. Ry. Mech. Engr., vol. 102, no. 1, Jan. 1928, pp. 27–29, 7 figs. Reclaimed material important factor in rebuilding cars; article describes operations in connection with overhauling of series of 750 composite hopper cars of 110,000 lb. capacity at Frankfort, Ind., shops of New York, Chicago & St. Louis Co.

Rebuilding Redesigned Box Cars on the New Haven. Ry. Mech. Engr., vol. 102, no. 2, Feb. 1928, pp. 89–94, 14 figs. Old shop facilities with modern tools used to good advantage; material distribution important; superstructure; steel reinforced ends using Z-bar end posts and angle diagonals, have been applied to large number of cars, other cars being equipped with all-steel ends; shop facilities; four electric trucks, one with boom, and one Fordson tractor, have been purchased for distribution of material; Plymouth gasoline dinky locomotive hauls cars from shop to shop.

CARS, PASSENGER

Reconstruction. Passenger Car Reconstruction on the D. & H. Ry. Mech. Engr., vol. 102, no. 1, Jan, 1928, pp. 23–26, 8 figs. Delaware & Hudson has incorporated number of new and unusual features of construction in design of two types of passenger cars which it has recently constructed and placed in service; two most prominent features are modified turtle-back roof, which has been adopted as standard for all passenger cars on system, and unusual interior arrangements planned to meet needs of travelers.

CASE-HARDENING

Nitriding Process. Nitralloy and the Nitriding Process, H. A. DeFries. Machy. (Lond.), vol. 31, no. 796, Jan. 12, 1928, pp. 478–479. Special alloy steels which can be surface-hardened by being subjected to action of ammonia gas while material is heated to approximately 875 deg. fahr. without subsequent quenching; remarkable resistance to metal-to-metal wear; excellent forging properties; machined satisfactorily in both annealed and heat-treated conditions; composition and uses; heat treatment previous to nitriding; nitriding process and equipment used for it; depth and hardness of case.

Surface Hardening by Nitrogen. Iron and Steel of Can., vol. 11, no. 1, Jan. 1928, pp. 19–21. Invention of Dr. Fry, of Research Laboratories of Friedrich Krupp, of Essen; process consists of subjecting parts to be hardened to action of ammonia gas at temperature of approximately 500 deg. cent. for period of time varying from 40 to 120 hr.

CAST IRON

Acid-Resisting. Acid- and Alkali-Resisting Cast Iron (Saeure- und alkalifestes Gusseisen), H-G. Haase. Stahl u. Eisen, vol. 47, no. 50, Dec. 15, 1927, pp. 2112–2117, 10 figs. Experiments on anti-corrosive, protective effect of carbon, silicon, manganese, phosphorous, sulphur, nickel and casting skin on solubility of cast iron in acids and alkalies of various concentrations and temperatures; suggests quantitative chemical composition of most resistant cast iron.

Alloy. Production and Uses of Nickel-Chromium-Iron and Cobalt-Chromium-Iron Castings, J. F. Kayser. Iron and Steel World, vol. 1, no. 10, Nov. 1927, pp. 717–718. Description of Ni-Cr-Fe and Co-Cr-Fe alloys suitable for castings; properties and uses of such alloy castings; "stainless" alloys. Abstract from paper read before Belgian Foundrymen's Assn.

Aluminum. Aluminum Cast Irons, A. B. Everest. Foundry Trade Jl., vol. 37, no. 592, Dec. 22, 1927, pp. 208–210, 1 fig. Discusses gray cast iron formed by addition of aluminum to low-silicon irons; mechanical tests were made on alloys formed by adding aluminum to American washed iron; results indicate that at moment there is no definite future for aluminum cast iron for normal purposes; no special properties have been shown which cannot be obtained by other simpler and better methods of treating cast iron.

Machinability. Data on Machinability and Wear of Cast Iron, T. H. Wickenden. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 206–212, 10 figs. Hardness or chemical composition of iron, by itself, no indication of wearing property and machinability; nickel, or nickel and chromium, intelligently added to iron to obtain correct microstructure for good wearing properties and machinability; analyses of cylinder blocks, pistons, clutch plates, brake drums, cams, and forming dies, in which nickel and chromium have been used; improvements secured.

Properties. Mechanical and Physical Properties of High-Grade Gray Cast Iron and Principles Underlying Its Production (Hochwertiger Grauguss, seine mechan.-physikal. Eigenschaften und die Grundlagen zu seiner Erzeugung). Zeit. fuer die gesamte Giessereipraxis, vol. 49, no. 1, Jan. 1928, pp. 2–4. Two forms in which carbon occur in cast iron are in chemically bound form (3 atoms iron with 1 atom carbon) known as iron carbide; and in elementary form as graphite separated from iron carbides by their disintegration.

Mechanical and Physical Properties of High-Grade Gray Cast Iron and Principles Underlying Its Production (Hockwertiger Grauguss, seine mechan.-physikal. Eigenschaften und die Grundlagen zu seiner Erzeugung), E. Zimmermann. Zeit. fuer die gesamte Giessereipraxis, vol. 49, nos. 2, 3 and 4, Jan. 8, 15, and 22, 1928, pp. 17–18, 28–29, and 38–39. Jan. 8: Deals with flake graphite; carbon and its influence on melting temperature; changes in structure following solidification; disintegration of iron-carbide crystals. Jan. 15: Subcooling: form and nature of graphitization. Jan. 22: Silicon: content of cast iron and its effect on graphite formation; absorption capacity of molten iron for gases.

The Influence of Nickel and Chromium on Cast Iron, A. B. Everest. Brit. Cast Iron Research Assn.—Bul., no. 19, Jan. 1928, pp. 7–9. Supplement to Bulletin No. 16, April 1927, giving details of papers on influence of nickel and chromium on cast iron; gives bibilography of recently published works.

The Mechanical Properties of Gray Cast Iron in Relation to Structure and Treatment (Die mechanischen Eigenschaften des Graugusses in Abhaengigkeit von Gefuege und Behandlung), K. v. Kerpely. Giesserei-Zeitung, vol. 25, no. 2, Jan. 15, 1928, pp. 37–49, 35 figs. Influence of cross-section on structure; cooling velocities; evaluation of investigations of Bolton, Rother, Oberhoffer, Piwowarsky, Wuest, Hanemann, etc.; influence of different alloying elements on strength; pouring temperature; annealing; superheated cast iron; critical discussion of different production methods for high-grade cast iron.

Wear. The Wear of Cast Iron. Brit. Cast Iron Research Assn.—Bul., no. 19, Jan. 1928, pp. 9–13. Review of recent experimental work, covering automobile pistons and cylinders; brake blocks; locomotive valve rings and work hardening.

CHROMIUM-VANADIUM STEEL

Heat-Treated. Correlating Test-Data on Heat-Treated Chromium-Vanadium Steels, E. J. Janitzky. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 55–59 and (discussion) 59–64, 6 figs. Work performed and procedure followed in correlating test results on specimens of heat-treated S.A.E. chromium-vanadium steel 6130, as basis for revision of physical-property charts for certain automotive steels; 115 tests including complete chemical analysis, tensile strength, and Brinell, scleroscope and Rockwell hardness tests; results given in frequency or probability curves.

CHUCKING MACHINES

Automatic. New Automatic Chucking Machine. Iron Age, vol. 121, no. 5, Feb. 2, 1928, pp. 336–338, 5 figs. Features of new chucking machine of single-spindle, work-revolving type; designed for boring, turning, facing and forming operations on forgings; simple tool set-up; brought out by Gridley Machine Co.; feed of tools by means of 2 tool-carrying bars having longitudinal and semi-rotative movement; hydraulic chucking employed; drive arrangement.

COAL

Carbonization, Low-Temperature. The Dvorkovitz Low-Temperature Carbonization System. Engineering, vol. 125, no. 3236, Jan. 20, 1928, pp. 72–73, 6 figs. Method developed for minimizing extent of cracking, preventing inconvenient cohesion in charge, and removing oil vapors almost immediately after they have been formed; consists in supplementing external heating of retort with producer gas, by introducing into upper parts of retort, and of its downward extension, supply of gas superheated to moderate temperature.

Pulverized. See PULVERIZED COAL

COAL HANDLING

Plant. Coal-Handling Plant at the Stourport Generating Station. Engineering, vol. 125, no. 3234, Jan. 6, 1928, pp. 11–13, 2 figs. Coal-handling plant installed is designed for unloading barges in canal basin and transferring coal unloaded either to store in front of boiler house or to boiler-house bunkers; alternatively, it can be used for reclaiming stored coal and transferring it to bunkers; describes quay cranes, hopper, conveyors, weighing apparatus, rolling stock; capacity of plant 50 tons per hr.

CONVEYORS

Belt. Belt Conveyors Handle Materials for Chicago Sewage Works. Construction Methods, vol. 10, no. 2, Feb. 1928, pp. 10–11, 7 figs. Describes belt conveyors used in building West Side sewage treatment plant in Chicago; mostly to handle cement and aggregates.

Belt Conveyor's Part in Handling Economies

Can. Machy., vol. 38, no. 26, Dec. 29, 1927, pp. 237–238, 4 figs. Design and selection of parts that compose belt conveyor application of proper type of drive and four types in common use; effect of pulleys; hugger drive preferable for conveyors too long to be driven by lagged pulley with snub; variety of materials; in handling materials rubber belts have their limitations; troughed belts work successfully at inclination; differential band brake; spacing idlers; each belt-conveyor installation constitutes separate problem.

COOLING TOWERS

Efficiency Testing. Efficiency Guarantees for Recooling Plants (Leistungsgarantien fuer Rueckkuehlanlagen), W. Otte. Archiv fuer Waermewirtschaft, vol. 9, no. 1, Jan. 1928, pp. 1–4, 7 figs. Criticizes usual acceptance tests required of recooling towers and similar installations because they involve entire motor-and-cooler system; proposes simplified shorter test involving only cooler apparatus; tables and curves of hourly temperature and humidity at Essen, by months.

CRANES

Electric. Material-Handling Crane Saves Time and Labor. Elec. World, vol. 91, no. 4, Jan. 28, 1928, p. 205, 1 fig. 5-Ton monorail electric crane installed at distribution headquarters of Los Angeles Gas & Electric Corporation has been found great aid in loading and unloading distribution transformers and handling other heavy material used in overhead and underground construction work.

Hydraulic, Portable. The Gerlinger Hydraulic Carrier. Engineering, vol. 126, no. 3234, Jan. 6, 1928, pp. 13–14, 2 figs. Consists of plain chassis, with deep bar-framed sides and open ends; this is carried on four wheels, rear pair of which is driven by gasoline engine, while front pair is used for steering; it is run by its own power over article to be lifted, which has been placed upon bars or other supports; shoes are inserted under ends of supporting bars, and, when raised by hydraulic apparatus, they lift up single article or built-up load, as case may be.

CRANKSHAFTS

Honing. External Cylindrical Honing. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, p. 73. Short résumé and discussion of L. A. Becker's Production-Meeting paper printed in The Journal for Oct. 1927; machine for honing bearing surfaces of crankshafts; honing said to produce bearing surface smoother and more true to form than produced by grinding alone or by grinding and polishing; no appreciable wear on any surface that had been honed; friction reduction of 25 per cent, in block tests; lubricant for honing.

CUPOLAS

Design. Cupola Design (Kupolofenkonstruktion), R. Thews. Giesserei-Zeitung, vol. 24, no. 24, Dec. 15, 1927, pp. 686–688. Aspects of design; relation between diameter and charge; height of furnace; number, size, and arrangement of tuyere levels; dimensioning of air pipes and windboxes, practical suggestions.

CUTTING TOOLS

Welded Tips. Cutting Tools with Welded Tips Made of High-Speed Steel (Schneidstaehle mit aufgeschweissten Plaettshen aus Schneidmetall), C. W. Drescher. Maschinenbau, vol. 7, no. 2, Jan. 19, 1928, pp. 49–55, 30 figs. Traces development of practice of welded tips in Germany; shaping of welded tip, methods of welding it on and results of performance tests; development of tungsten-carbide and cobalt-chromium-tungsten alloys; standardization and uses of cutting steels; practical experience with special cutting steels.

D

DIE CASTING

Machines for. Die-Casting Equipment with Automatic Features. Iron Age, vol. 121, no. 6, Feb. 9, 1928, p. 407, 1 fig. Madison-Kipp Corp., Madison, Wis., has placed on market die-casting machine, operation of which is entirely automatic; feature stressed is that in no case is more than one operator necessary; molten metal delivered to die by air pressure.

Madison-Kipp Die-Casting Machine. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 460–463, 7 figs. Machines adapted to production of die-castings; air-operated, gooseneck type of machine; all subsequent movements of machine and die are fully automatic; stopped and reversed at any point; mechanical features of machine; arrangement of gooseneck and elevating mechanism; arrangement of furnace and melting pot; die for clutch collars; dies for lubricator eccentrics; provision made for dissipating heat.

Non-Ferrous Metals. The General Aspects of Die-Casting, T. P. Russell. Metal Industry (Lond.), vol. 32, no. 1, Jan. 6, 1928, pp. 5–7. Discusses history and future prospects of die-casting industry, with special reference to non-ferrous die-casting; such processes have of late years made marked progress and are among those most favored by metal founders for machine parts and small casting. Paper read originally before Sheffield Metallurgical Assn., but revised for this journal.

DIES

Quenching. High Temperature Quenching Treatment Applied to Cold Heading Ball Dies of Plain Carbon Tool Steel, F. L. Wright. Am. Soc. Steel Treating—Trans., vol. 8, no. 2, Feb. 1928, pp. 282–293 and (discussion) 293–296, 5 figs. Describes quenching treatment for cold-forming dies, and submerged water-spray quenching fixture used for quenching double-end ball-heading dies; increase in quenching temperature from 1470 to 1620 deg. fahr. followed by suitable tempering treatment has doubled life of dies; results of endurance tests compared to variations in chemical analysis, to normality of tool steel as determined by McQuaid-Ehn carburizing test, and to hardness penetration.

DIESEL ENGINES

Automotive. The Acro Diesel Engine with Air Storage (Le moteur Diesel "ACRO" à emmagasinage d'air), Sribeck. Technique Automobile et Aérienne, vol. 18, no. 139, 1927, pp. 105–118, 25 figs. Describes principal characteristics of this new engine and treats of its points relative to its use as automobile or aviation engine; describes parts of engine and tests to determine cylinder-pressure variations and temperature in cylinder which are shown in several charts; influence of speed, form of compression chamber and its effect on efficiency.

The Automotive Full-Diesel Engine, R. J. Broege. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 177–182, 8 figs. Description of tests with compressorless, solid-injection, full-Diesel engine of 4-cycle operation, as developed by M.A.N. of Germany, for application in all industrial automotive installations; 50-hp. engine installed in 4-ton truck; performed as well as gasoline engine of same bore in same truck, but with greater fuel economy and more lugging ability; American-built 4-cycle engine tested; similar to heavy-duty automotive-type gasoline engine; engine started by electric starters or by two-cylinder air-cooled gasoline engine; controlled by two levers regulating fuel pump, replaces magneto.

Centrifugal Castings for. Centrifugal Castings for Diesel Engines, J. E. Hurst. Diesel Engine Users Assn.—Paper, Nov. 25, 1927, 20 pp., 14 figs. Describes kind of castings needed for Diesel engines; behavior of cast iron when in molten state and when cooling and treats of centrifugal casting process, chemical composition and properties of centrifugal castings, their resistance to wear and heat conditions; also spun-sorbitic centrifugal castings as used by author.

Double-Acting. A New Type of Solid Injection Double-Acting Two-Stroke Oil Engine, F. Sass. Inst. Mar. Engrs.—Trans., vol. 39, Dec. 1927, pp. 627–669 and (discussion) 669–689, 36 figs. Complete description of Hesselman A.E.G. Diesel engine developed to replace B. & M. engines formerly made by A.E.G.; results of tests on 1000-b.hp. single cylinder engine at 120 r.p.m.

The Friend-Bentley Double-Acting Diesel Engine. Commonwealth Engr., vol. 15, no. 3, Oct. 1927, pp. 103–105, 4 figs. Australian patented design, Friend-Bentley engine is of Diesel or full-injection type; can be constructed to weigh less than 135 lb. per b.hp. at 100 r.p.m.

The Latest M.A.N. Double-Acting Engine, H. Becker. Brit. Motorship, vol. 8, no. 94, Jan. 1928, pp. 385–388, 8 figs. New model with various modifications; adoption of airless injection with stationary engines; with this new design weight of double-acting two-stroke engine of normal type for marine work, developing 7000 b.hp. at 125 r.p.m., works out at 51 kg. (113 lb.) per b.hp.

Fuel Consumption. Tests of Efficiency and Fuel Requirements of Diesel Engines (Leistungs- und Brennstoffverbrauchsversuche an Dieselmaschinen). Zeit. des Bayerischen Revisions-Vereins, vol. 32, no. 1, Jan. 15, 1928, pp. 3–5. Presents tabular data giving results of tests carried out in 1926, showing considerable increase in economy of installations as compared with earlier investigation.

Power Plants, Use in. The Use of Diesel Engines for Peak Load Supply. Engineer, vol. 145, no. 3758, Jan. 20, 1928, pp. 78–79. Whereas writer's immediate plea is for continued use of existing oil engines, general question of use of steam turbines for basic load for which they are eminently fitted and use of oil engines for peak load should not be overlooked; oil engine costs only half as much for fuel for peak-load units and less for labor, while it is very questionable whether, when new peak-load stations have to be put up, their capital cost would be any less with steam turbines than with oil engines.

Superior-Otto. Heavy Duty Diesels Designed for Continuous Service. Oil Engine Power, vol. 6, no. 2, Feb. 1928, pp. 94–97, 5 figs. Detailed description of Superior-Otto series of vertical, four-stroke-cycle engines; available in sizes from 60-b.hp. to 360 b.hp. with one, two, three, four, or six cylinders; base casting; main bearings; crankshaft construction; cylinder and valve assembly; piston and connecting rod; fuel supplied from cam-actuated fuel pump; combined oil filter and cooler mounted at rear end of engine; control gear.

DROP FORGING

Practice. Drop Forging Industry and Equipment, M. S. Reed. Heat Treating and Forging, vol. 14, no. 1, Jan. 1928, pp. 32–33 and 40. Present status of industry and improvements in methods and equipment to meet changed conditions; four-roll board-drop hammer; speed and accuracy of hammer operation; withdrawal of obsolete equipment; new uses found for drop forgings.

E

ECONOMIZERS

High-Pressure. Economizers for High-Pressure Steam (Rauchgasspeisewasservorwaermer fuer Hochdruckdampf), H. F. Lichte. Waerme, vol. 51, no. 1, Jan. 7, 1928, pp. 3–8, 18 figs. General discussion of economizer design; evolution from high-pressure to super-pressure economizer; details of Stierle ribbed-tube economizer with square ribs; details of tube material and elbow joints; data on thermal efficiency, and description of actual installations.

ELECTRIC FURNACES

Annealing. Electric-Elevator Furnace Anneals Steel Castings, L. M. Bassini. Am. Mach., vol. 68, no. 4, Jan. 26, 1928, pp. 161–163, 4 figs. Construction and operation of electrically operated car-type furnace of Burnside Steel Foundry Co.; heating chamber above floor; work piled on annealing racks placed on car; car wheeled under furnace, and lifted into heating chamber; special sand seals provide airtight joint between car and furnace; elevator operated by 3-cylinder pump driven by electric motor; output one ton per hour; 1650 deg. fahr. obtained by four Nichrome ribbons.

Control. Automatic Control of Electric Furnaces, L. G. Bean. Elec. Light and Power, vol. 6, no. 2, Feb. 1928, pp. 64–70 and 91, 10 figs. Tells what automatic control accomplishes, how it operates, what instruments are used for it and how they are connected to various kinds of furnaces; advantages of automatic control are generally conceded to be more even product; lower labor charges; longer life of furnaces due to not overheating; saving of fuel.

High-Frequency. A New Electric Steel Furnace. Elec. Rev., vol. 101, no. 2612, Dec. 16, 1927, pp. 1029–1031, 4 figs. High-frequency Ajax-Northrup furnace installed at Sheffield, England; steel produced under crucible conditions; eddy currents induced in steel itself, before and during melting; no heat is passed from exterior of crucible to metal within; supply frequency 2200 cycles per sec. and pressure 1200 volts; small space occupied. See description in Elec. Times, vol. 72, no. 1886, Dec. 15, 1927, pp. 780–782, 5 figs.

Melting. Presents Cost Data on Electric Furnace Melting, J. B. Meier. Foundry, vol. 56, no. 3, Feb. 1, 1928, pp. 93–98, 5 figs. Author presents unbiased and accurate continuous record of actual conditions as encountered in foundry with which he is associated, dealing solely in rough castings; includes graphic representation of electric-furnace operation over period of 8 months; résumé of cost per ton.

Miguet. New Miguet Electric Furnace with Continuous Electrodes (Le noveau four électrique Miguet à électrode continue), R. Sevin. Jl. du Four Electrique (Supp.), vol. 37, no. 1, Jan. 1928, pp. 5–8, 5 figs. Description of electric

furnace at Montricher using single-phase current; incoming current at 5000 volts transformed by 5 transformers; operation also described and complete installation.

ELECTRIC LOCOMOTIVES

Maintenance and Repairs. Electric Locomotive Maintenance, A. McLanahan. Ry. Mech. Engr., vol. 102, no. 2, Feb. 1928, pp. 109–112, 5 figs. Modern electric locomotive repair shop is now in operation on Virginian, at Mullens, West Virginia; general layout; main shop; machine shop contains machine tools, all of which have individual motor drive; drying and baking ovens; dipping tank; substation; since shop has been in full operation layout has been found to meet requirements completely.

Operation. Some Points Regarding Electric Locomotive Operation, T. Rich. Elec. Times, vol. 73, no. 1891, Jan. 19, 1928, pp. 78–79, 3 figs. Describes method used on electric locomotives to keep center of gravity from being too low and to minimize unsprung weight; how motors are geared to driving axles; advantage of electric hauling over steam.

ELECTRIC WELDING

Methods. Electrical Welding and Hardening Processes. AEG Progress, vol. 3, no. 12, Dec. 1927, pp. 379–384, 20 figs. Electric equipment and methods for hardening and welding; electric salt-bath furnaces for hardening cutting tools; electric hardening furnaces for hardening carbon steels; electric annealing and tempering furnaces; arc welding and resistance welding; electric fusion butt welding employed in manufacture of highly stressed machine parts; sheets of metal welded together by spot welding; elasticity depreciated by electric arc welding; atomic arc-welding process.

ELECTRIC WELDING, ARC

Cutting and. Arc Welding and Cutting. Am. Welding Soc.—Jl., vol. 6, no. 12, Dec. 1927, pp. 1–76, 61 figs. Information and instructions for making of arc welds compiled by Educational Committee of Am. Welding Soc. as source of reference of fundamentals of arc welding; comprehensive and detailed treatise on welding of all kinds of metals, apparatus and equipment and qualifications for arc welders.

"Electronic Tornado." "Electronic Tornado" Tests Show Welds of Much Promise. Can. Machy., vol. 39, no. 2, Jan. 26, 1928, pp. 42 and 44, 7 figs. Extracts from laboratory bulletin issued by Lincoln Electric Co.; test pieces briefly described; purifying effect of electronic tornado; examples of work; micrographs of common steel plate, metallic arc weld and electronic tornado weld; grain size in new process exceedingly fine and uniform; resembles raw steel in structure; actually electronic tornado weld is heat-treated steel and entirely free from undesirable hardness.

Equipment. Some Considerations on Arc Welding and Choice of Equipment (Quelques considérations sur la soudure à l'arc électrique et sur le choix d'un équipement), F. Lorne. Électricité et Mécanique, no. 21, Nov.-Dec. 1927, pp. 23–30, 9 figs. Suggestions to act as guide on choice of equipment and information on method of utilizing current and electrodes for particular case at hand; application to different metals and different kinds of welding.

ELEVATORS

Electric, Door Operators for. An Elevator-Door Operator That Splits Seconds. Power, vol. 67, no. 6, Feb. 7, 1928, pp. 251–252, 4 figs. Details of new door-opening equipment developed by F. A. Boedtcher, New York City; instead of one operating door as has been previously used on elevator doors, in this equipment there are two, purpose of which is to overcome tendency that single door has to tip door and cause them to bind and in some cases break door hangers.

EMPLOYEES' REPRESENTATION

Moderate-Sized Plants. Employee Representation in a Single Unit Organization with Less Than 1,000 Employees, R. A. Lukens. Personnel, vol. 4, no. 4, Feb. 1928, pp. 114–118. Author describes method used by Continental Mills, Inc., in initiating plan of employee representation and carrying it on; formation of joint council; eligibility for mill council; vacation plan.

F

FORGE-SHOP PRACTICE

Methods. Forging Machine Practice, W. S. Dewell. Machy. (Lond.), vol. 31, no. 797, Jan. 19, 1928, pp. 513–516, 5 figs. Taper upsets, practically all of which are in header tool; each operation to cover amount of work which will make following operation success; depth of header tool recess greater than length of unsupported stock; diameter at mouth of header tool controlled by length of metal to be upset; greatest length of unsupported stock successfully upset is approximately three diameters; examples of connecting-rod end and pinion shaft.

Forging Methods and Heating to Forge, W. M. Hepburn. Heat Treating and Forging, vol. 14, no. 1, Jan. 1928, pp. 41–43, 6 figs. Classification of forging methods; relation of proper heating to good results and certain types of furnaces that have been used to advantage; describes continuous-type furnace; end heating for upsetting. Abstract of paper presented before Am. Gas Assn.

Modernizing Forging Practice, F. W. Manker. Iron Age, vol. 121, no. 6, Feb. 9, 1928, pp. 401–404, 5 figs. Methods and equipment of forging shop at plant of Willys-Overland, Toledo, Ohio; shop is so designed that work progresses from one operation to another with least amount of "float" trucking and handling; all hammers are served with individual forging furnaces and both are so arranged as to allow greatest volume of output with minimum of labor, fuel, power, etc.; separation of heavy from light work.

FOUNDRIES

Non-Ferrous. New Plant Widens Scope of Output. Iron Age, vol. 121, no. 5, Feb. 2, 1928, pp. 328 and 329, 3 figs. New foundry and machine shop of Hills McCanna Co. described; larger sizes of individual castings and heats from wider range of non-ferrous metals obtained; 11 oil-fired furnaces; molding machines; Pridmore stripper, 2 electrically operated sand riddles and sand mixer; small molds made in steel flasks; core room, core ovens, gate and riser cutting-off machines and sand-blast equipment; duorail and monorail systems for handling materials; fuel oil from central pumping station.

FOUNDRY PRACTICE

Developments in. Recent Developments in Cast Iron and Foundry Practice. Brit. Cast Iron Research Assn.—Bul., no. 19, Jan. 1928, pp. 14–18. Reviews paper by Moore and Lyon on fatigue tests on cast iron; paper by Schwarz on tests of cast iron, results being given in tabular form; tests carried out by British Oxygen Company on strength of cast iron at very low temperatures; malleable cast-iron specifications.

Economical Methods. Foundry Effects Substantial Savings, C. H. Vivian. Brass World, vol. 23, no. 12, Dec. 1927, pp. 395–400. Most modern methods utilized to produce 400 tons of motor castings daily; details of procedure in casting room; hundreds of units driven by compressed air; in making of castings, "straight line" method is used; transportation facilities at hand are such that casting may be loaded on afternoon of day on which it was made and reach its destination at Detroit automobile factory on following morning; practice of Campbell, Wynant & Cannon Foundry Co., Muskegon, Mich.

Steel Foundries. Steel-Foundry Practice (Aus der Stahlgiessereipraxis), L. Treuheit. Stahl u. Eisen, vol. 47, no. 50, Dec. 15, 1927, pp. 2101–2108, 6 figs. Selection and mixing of molding materials; analysis of sands by author's elutriating method; microscopical examinations; comparative cost data on economy of filling and ramming by various methods showing that mechanical methods using special machines are most efficient and most economic. See also Giesserei-Zeitung, vol. 24, no. 24, Dec. 15, 1927, pp. 684–685.

FREIGHT HANDLING

Containers. Road-Rail Traffic on the L. M. S. R. Ry. Gaz., vol. 47, no. 27, Dec. 30, 1927, pp. 817–818. English practice of using containers for handling and transportation of merchandise; development of container traffic; types of containers in use; service considerations; underframes and chassis; reduction of claims for goods damaged in transit; lifting tackle and crane power.

FURNACES

Annealing, Continuous. Continuous Annealing Furnaces, F. W. Manker. Heat Treating and Forging, vol. 14, no. 1, Jan. 1928, pp. 47–50 and 54, 4 figs. Progress in art of and equipment for annealing steel sheets and patenting wire; Victor Peninsular furnace for small parts; elements influencing progress; efforts to eliminate pits and scratches and water-cooled shafts; problem of wasters not solved. Abstract of paper delivered before Engrs.' Soc. of West. Penn.

Reverberatory. Study of the Flow of Gases in Reverberatory Furnaces, W. K. Thompson. Eng. Jl., vol. 11, no. 1, Jan. 1928, pp. 25–33, 25 figs. Chemistry of reverberatory smelting of copper concentrates; combustion of oil; comparison of volume of air consumed per pound of fuel, and products of combustion; reverberatory furnaces considered as hydraulic reservoirs; flow of air through ports in bridge wall and its distribution; measurement of volume of gases flowing through furnace; draught depression necessary to remove products of combustion; paper is written from standpoint of hydraulics and hydrostatics.

G

GAGES

Inspection Devices and. Inspection Devices in the Westinghouse Plant, W. H. Miller. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 409–412, 8 figs. Gages and inspection devices required in manufacturing at East Pittsburgh plant; 8000 different special gaging devices; testing concentricity of motor end brackets; checking parallelism of keyways; fixture for finding angles of gages; inspecting gas-engine pistons; determining depth of counterbored hole; device employed in inspection of crankshaft; gage for finding angle of foot castings.

GASOLINE ENGINES

High-Power. High-Power Engines (Moteurs à grande puissance spécifique), H. R. Ricardo. Technique Automobile et Aérienne, vol. 18, no. 139, 1927, pp. 125–127, 3 figs. Treats of case of modern gasoline engine having compression ratio of 5, and having cylinder filled with air or combustible mixture at atmospheric pressure at end of suction stroke; efficiency is touched upon, also cycle of operation when air is carbureted.

GEAR CUTTING

Gear Generators. A High-Speed Gear Generator. Automobile Engr., vol. 18, no. 237, Jan. 1928, pp. 21–22, 2 figs. Features of new Maag gear generator; reciprocating speed of from 180 to 200 strokes per minute; rack type of cutter with absolute minimum of overhang; separate rack-shaped backing plate; lateral adjustment ensures face of cutter is set parallel to work slide; 3 types of cutter; taking up play in lead screw and nut and, automatically, back-lash in gears; balancing mechanism for cutter slide; locating gear blank from bore; machine for planing spiral gears.

GEARS

Design. Gearing. Automotive Abstracts, vol. 6, no. 1, Jan. 20, 1928, p. 17. Review of number of articles in Maschinenbau, Nov. 17, 1927, on gearing, both toothed and hydraulic, which cover subject very completely from point of view of general arrangement and kinematics; some of articles seem to indicate that Germans, under leadership of Burmester and Kutzbach, have developed whole new science of gearing design; this science refers to general arrangement of drives, not to tooth form.

GRINDING

Automobile Parts. Abrasive Engineering Practice in Automobile Manufacturing, F. B. Jacobs. Abrasive Industry, vol. 9, no. 2, Feb. 1928, pp. 48–52, 4 figs. Describes disk grinding with hand feed and automatic feed with abrasive wheels, use of jigs, finish allowance for various classes of work, necessity for free cutting disks, maintenance of disks, their truing and setting up.

Face. Saving Material by Face Grinding. Machy. (Lond.), vol. 31, no. 797, Jan. 19, 1928, pp. 517–518, 2 figs. Saving of metal made by face-grinding parts otherwise finished on other types of machines; face-grinding machine produces flat surface at once; saving on good-sized run important enough to warrant pattern changes and more exacting foundry methods; definite figures obtained at several different plants; to obtain best results, cooperation between draftsman, foundryman and machine-shop foreman required.

GRINDING MACHINES

Design. Achievement in Grinding Machine Design During 1927, H. Rowland. Can. Machy., vol. 39, no. 1, Jan. 12, 1928, pp. 27–37, 22 figs. Exhaustive survey of developments in grinding machines during 1927; treats of feeds and drives and products of various manufacturers with notes on features of each machine.

Internal. A New Brake Drum Grinder. Automobile Engr., vol. 18, no. 237, Jan. 1928, p. 28, 1 fig. Features of heavy-duty machine for internal grinding; Cincinnati brake-drum grinder entirely self-contained; centralized control; permanently mounted sizing indicator; wheel-truing device; 30-hp. motor to drive

grinding-wheel spindle built into machine; new tex-rope method of transmitting power to wheel spindle; spindle unusually heavy for internal grinder; water tank enclosed within main bed casting; Carborundum Aloxite wheel used.

H

HARDNESS TESTS

Methods. A Résumé of the Magnetic Methods Employed in Studying the Mechanical Properties of Matter, S. R. Williams. Instruments, vol. 1, no. 1, Jan. 1928, pp. 29–38, 9 figs. Recent laboratory device for testing hardness of steel balls by magnetic means; most desirable is instrument which can be carried directly into shop or field and any member of structure tested where it is being used; experiments described have been selected with idea that apparatus employed in each research is capable of further development by instrument makers into more practical devices.

Methods of Hardness Testing. Am. Mach., vol. 68, no. 5, Feb. 2, 1928, p. 231, 2 figs. Comparison of Brinell and Rockwell readings; table and charts for ready shop and laboratory reference; Rockwell B readings taken using 1/16-in. diameter steel ball and 500-kg. major load; C readings taken with conical diamond penetrator and 150-kg. major load.

HEAT TREATING PLANTS

Equipment. Automatic Heating and Heat Treating Units Synchronize Auto Production, J. B. Nealey. Iron Trade Rev., vol. 82, no. 5, Feb. 2, 1928, pp. 315–317, 3 figs. Describes methods and equipment of Fordson Plant of Ford Motor Co., vast majority of heating and heat-treating operations are on gas; in steel-making department are 7 basic open-hearth furnaces; main heat-treating department, one of largest in world, includes 40 cyanide, 19 continuous and 6 periodic furnaces.

Equipment and Operation of a Heat-Treating Plant, M. G. Jewett. Am. Mach., vol. 68, no. 4, Jan. 26, 1928, pp. 171–172, 4 figs. Heat-treating plant of Chain Belt Co. described; temperature regulated by automatic recording controllers; portable quenching tanks equipped with revolving drums and helical conveyors to carry work through water or oil; four rotary carburizing machines, two rotary drawing furnaces and one rotary, continuous heat-treating machine; Greene quenching machine; gas for heating; 14 tons per 24-hr. day; operated by two furnace tenders and foreman on each 12-hr. shift.

HIGH-SPEED STEEL

Hardening. Defects at the Hardening of High Speed Steels, E. Houdremont and H. Kallen. Am. Soc. Steel Treating—Trans., vol. 8, no. 2, Feb. 1928, p. 323. Difficulties of high-speed steel hardening may be traced to fact that hardness of this steel is retained until temperature close to melting is reached; authors discuss particular case of defective hardening. Translated from V.D.I. Zeit., Feb. 19, 1927, p. 269.

I

ICE PLANTS

Unusual Features in. 12-Ton Plant Employs Unusual Features, W. W. Taylor. Refrigeration, vol. 43, no. 1, Jan. 1928, pp. 69–72, 7 figs. Machinery and equipment of plant of 12 tons, capacity of Mason Brown Ice Co., Huntsville, Alabama; total horsepower in this plant is 51¼; vertical compressors employed.

INDUSTRIAL MANAGEMENT

Budget Control. Production and Inventory Budgets, T. R. Jones. Am. Mgmt. Assn.—Annual Convention Series, no. 67, pp. 3–9 and (discussion) 9–14. Discusses factors which production budget should determine; relation of production budget to sales budget; how purchase of raw material and supplies should be correlated with production program; purpose of inventory budget; how raw materials and fabricated products should be budgeted; how standards should be applied to inventory budgets; forms which should be used.

Production Control. Integrated Production. Soc. Automotive Engrs.—Jl., vol. 22, no. 1, Jan. 1928, pp. 71–73, 1 fig. Brief résumé and discussion of E. P. Blanchard's Production-Meeting paper published in Journal for Oct. 1927, p. 375; progress due to "simultation" with multiple-head machines; economical production obtained in period of reduced schedule by keeping all machines in group running but reducing speed and number of operators; setting equipment for production little greater than planned quantity; critical point at which cost per piece becomes greater with simple machine than with more refined.

Quantity Production with Standard Tools, M. E. Lange. Am. Mach., vol. 68, nos. 2 and 4, Jan. 12 and 26, 1928, pp. 51–54, 10 figs., and 167–170, 11 figs. Jan. 12: When and how standard tools can be used to advantage; problem of increasing production to maximum with least possible tool cost; tools for turning; combined cuts on chucking work; obtaining rigidity without interference; advantages of great range of standard multiple turning head; boring and recessing; standard stub boring bars. Jan. 26: Possibilities and advantages of standard tools for quantity production when all hexagon-turret stations are filled, wide tools should not be mounted in adjacent hexagon-turret stations, but arranged on alternate turret stations; in extreme cases of interference, it is cheaper to keep standard tooling of hexagon turret intact and to confine special work to making of cutter blocks for cross slike; in extreme cases of quantity production, expense of special square turret is justified; taper formed by special tool.

300 Per Cent Greater Production with 65 Per Cent Less Inventory, W. C. Beattie. Mfg. Industries, vol. 15, no. 1, Jan. 1928, pp. 59–62, 7 figs. Noteworthy accomplishment of Westinghouse Mansfield Plant through production control; to handle work on most economical basis and maintain high quality with lower production cost, well-developed control system necessary; this must be coordinated with sales, on one hand, and it must also correlate with purchasing and storekeeping on other hand, to hold inventories of materials to safe minimum.

Problems Requiring Research. Management Problems Requiring Research, H. A. Hopf. Am. Mgmt. Assn.—Proc. of Inst. of Mgmt., no. 3, 1928, pp. 2–7 and (discussion) 8–12. Presents statement of descriptive character concerning particular problems of management which are susceptible of research, and especially with respect to those which seem to be in most immediate need of scientific investigation; author discusses, with respect to organization structure, functionalization, coordination, consolidation, and centralization of control with decentralization of activities.

Production Orders. Manufacture Effectively Coordinated by Simple System. Iron Age, vol. 121, no. 3, Jan. 19, 1928, pp. 194–196, 9 figs. Avoidance of over-elaboration has been fundamental consideration of Landis Machine Co., Waynesboro, Pa., in developing production order system for coordination of its manufacturing operations; at plant production orders are issued and returns collected by central department.

Shop Management, Cooperative. A Cooperative Shop Management System That "Works." Can. Machy., vol. 39, no. 2, Jan. 26, 1928, pp. 24–25. Cooperative idea in operation at Canadian National shops at Stratford; no labor troubles; shop council composed of 14 members, seven from management and seven from shops, elected by men in various departments; suggestions made by men themselves that were of value; men working in Canadian National shops using their inventive genius and their powers of observation to make conditions such that work can be carried on to very best advantage; idea to take place of strikes and lockouts.

INDUSTRIAL TRUCKS

Electric. A New Electric Platform Truck. Ry. Engr., vol. 49, no. 576, Jan. 1928, pp. 26 and 40, 2 figs. These vehicles which are of new type, are specially fitted for wheel and axle transporting and adaptable to variety of useful purposes in railway shops; power for driving truck and elevating mechanism is obtained from 24-cell 300-ampere-hr. nickel-iron battery.

INTERNAL-COMBUSTION ENGINES

Crankcase Scavenging. Crank Case Scavenging of a Two-Stroke-Cycle Engine, O. Holm. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 446, Jan. 1928, pp. 1–11, 22 figs. Experiments to find effect variation of height of scavenge and exhaust ports on scavenging efficiency as determined by gas analysis; effect of changes in shape of scavenge channel and piston openings; smaller early exhaust favorable; results confirmed on other engines; important not to dissipate kinetic energy of gases in large mufflers, but to utilize it. Translated from V.D.I. Zeit., June 11, 1927.

Supercharging. Some Aspects of Supercharging for Sea-Level Conditions, C. F. Taylor and L. M. Porter. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 195–199, 5 figs. Series of tests using internal-combustion engine with variable expansion ratio; testing at normal atmospheric pressure with supercharger to increase power output; tests indicate results in horsepower and efficiency attained in automobile engines by independently varying expansion ratio and total compression ratio; theoretical horsepower and efficiency computed for conditions of tests; curves show results of variations in different factors and compare test results with calculated values.

Thermal Efficiency. Standards of Thermal Efficiency for Internal-Combustion Motors, D. Clerk. Engineering, vol. 125, no. 3234, Jan. 6, 1928, p. 10. Discussion of report of Heat Engine Trials Committee, discussing ideal efficiency standards for four distinct engine cycles, (1) constant-volume; (2) constant-pressure, (3) Diesel, and (4) Atkinson; points out that Atkinson cycle gives high ideal thermal efficiency, and engines built to follow it would be very economical, but no engines existing at present carry out cycle required to produce such efficiencies. Abstract of paper read before Instn. of Civ. Engrs.

Variable-Stroke. An Analysis of the Andreau Cycle, C. W. Olliver. Power Engr., vol. 23, no. 262, Jan. 1928, pp. 6–7, 7 figs. Gives general formula for motion of both piston and knuckle-joint, from which effect of various variable quantities of problem on form of curve and cycle may be readily appreciated; relates to Andreau variable-stroke internal-combustion engine.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GASOLINE ENGINES; OIL ENGINES.]

IRON CASTINGS

Cleaning. Speed Marks Cleaning Procedure in New Buick Plant, P. Dwyer. Foundry, vol. 56, no. 3, Feb. 1, 1928, pp. 99–104, 9 figs. Methods and equipment for handling and cleaning castings in Buick foundry, Flint, Mich.; equipped with 6 long and 2 short conveyors, handling 500 tons of automobile-engine castings daily; methods of disposing of burned core sand and scrap knocked off castings; handling debris and reclaiming metallic content; cleaning-room equipment, including tumbling barrels, sand-blast units, etc.

The Cleaning of Iron Castings (Putzereifragen), Gertreudts. Giesserei-Zeitung, vol. 25, no. 2, Jan. 15, 1928, pp. 50–53, 6 figs. Results of tests on cleaning with water jet; savings effective in labor and time; it is claimed that technical advantages and economy of process have been established beyond doubt.

Cylinders. Some Further Notes on Oil-Sand and Motor Cylinders, W. West. Foundry Trade Jl., vol. 37, no. 592, Dec. 22, 1927, pp. 211–213, 5 figs. Results given represent beginning of extensive series of practical experiments to explore nature and use of all media which might be of service to foundryman in oil-sand mixture; rosin as an agglomerant; effect of mixing and milling upon grain size of sand mixture.

Diesel-Engine. The Production of Diesel Engine Castings in Pearlitic Cast Iron. Foundry Trade Jl., vol. 37, no. 592, Dec. 22, 1927, pp. 215–216. Discussion of lecture by A. J. Richman before Inst. Brit. Foundrymen; points out close relationship between resistance to wear and Brinell hardness number.

Shrinkage Holes. Shrinkage Holes in Small Grey Iron Castings, P. A. Russell. Foundry Trade Jl., vol. 38, no. 597, Jan. 26, 1928, pp. 55–59, 19 figs. Points out that there is no general agreement as to root cause of shrinkage, or drawing, as author prefers to call it; definition of phosphorus; conditions during solidification; effect of composition; drawing of semi-steel cast iron; practical examples; cause of drawing is that expansion due to formation of graphite is practically all absorbed in expanding outer shell of casting, and remaining liquid shrinks.

L

LATHES

Design. Lathes, E. Pull. Machy. Market, no. 1419, Jan. 13, 1928, pp. 19–20, 6 figs. Design and operation of lathes; driving arrangement for small lathe; calculations for various speeds; triple-gear 4-step cone head stock with range of 12 speeds, progressively graded with single-speed countershaft; triple-gear rapid-reduction headstock for lathes of 10½-in. centers and upward; all-geared headstocks frequently fitted to lathes of 6-in. centers and upward.

Turret. Special Chuck for Small Brass Gear Blanks, B. J. Stern. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, p. 441, 2 figs. Design and operation of chuck for holding gear blanks and of loading fixture for placing work; equipment for Brown & Sharpe automatic turret lathe; blanks machined before teeth are cut; to give jaws better grip on rough casting, holding ends of jaws serrated; jaws are expanded to grip work by means of hardened steel plunger which is sliding fit in plate; work loaded into chuck by automatic device, in accordance with predetermined cycle of operations; device for placing work in chuck.

LIFTING MAGNETS

Foundries. Electric Power in the Foundry. Foundry Trade Jl., vol. 36, no. 580, Sept. 29, 1927, p. 276. Deals with lifting magnet for both external and internal use; for lifting pig and scrap iron and large solid matters a circular magnet is used, while for handling long plates two or more of these magnets may be used, spaced on beam slung from crane hook.

LOCOMOTIVE BOILERS

Foaming in. Foaming of Locomotive Boilers, with Special Reference to Influence of Suspended Matter on Foaming, and Cost of Blowdown. Am. Ry. Eng. Assn.—Bul., vol. 29, no. 300, Oct. 1927, pp. 143–157, 3 figs. Problem is to determine cause of foaming in locomotive boilers and also other causes of wet steam; for foaming tests, boilers must be divided into three classes: stationary, road locomotives and switch engines; instructing enginemen as to amount of water to be blown off; charts illustrating conditions of water from locomotive boilers on Chicago & Alton R.R.

High-Pressure. Proposed High Pressure Water Tube Boiler, L. A. Rehfuss. Ry. Mech. Engr., vol. 102, no. 2, Feb. 1928, pp. 68–73, 3 figs. Greater efficiency and tractive force may be developed with boiler designed for 500 lb. pressure; stress placed on combustion efficiency; advantage of air preheater; double superheater employed; advantages of proposed boiler; judicious use of electric welding should take care of most of joints in actual construction; steam generation.

Improving. Improving the Locomotive Boiler by Research, L. H. Fry. Boiler Maker, vol. 28, no. 1, Jan. 1928, pp. 11–14, 3 figs. Shows how research can be directed to extending existing knowledge of locomotive boiler; with this in view fundamental processes of combustion and heat transfer are surveyed; boundaries of existing knowledge are mapped out and indications given as to how these boundaries may be enlarged and benefits that might be expected.

LOCOMOTIVE REPAIR SHOPS

Wabash Ry. Wabash Enlarges Locomotive Shops. Ry. Mech. Engr., vol. 102, no. 1, Jan. 1928, pp. 41–45, 5 figs. Wabash recently completed extensive improvements at its system shops at Decatur, Ill., which embodied enlargements of locomotive repair shop in accordance with most unusual plan; study plans for enlargements; some rearrangement necessary; method of routing repair work; new shop of modern design; new power plant.

LOCOMOTIVES

Compound. Some Experimental Results from a Three-Cylinder Compound Locomotive, L. H. Fry. Eng., vol. 124, no. 3233, Dec. 30, 1927, pp. 855–858, 4 figs. Determination of power by measurement of steam pressures and temperatures; quality of steam at high-pressure cut-off; heat transfer to cylinder walls; actual vs. theoretical cylinder efficiency. Paper read before Institution of Mech. Engineers.

Cut-Off Adjustment. Back Pressure and Cut-Off Adjustment for Locomotives, T. C. McBride. Ry. and Locomotive Eng., vol. 40, no. 12, Dec. 1927, pp. 350–352, 1 fig. Question arises as to when or under what operating conditions of locomotive, back pressure can be made useful in its indication of proper adjustment of cut-off; it is evident that something better and more exact than judgment of enginemen is needed to indicate best adjustment of cut-off in order that this adjustment may be made exactly and quickly; back-pressure gage properly used should fill this need.

Diesel. Dieselizing Railroads, W. Arthur. Central Ry. Club—Official Proc., vol. 35, no. 5, Jan. 1928, pp. 2500–2515, 6 figs. Description of Diesel locomotives as used in Europe; how Diesel unit compares with electric and steam locomotives, and economy in fuel; Diesel cost is $^1/_3$ that of steam; relationship of tractive effort and speed, transmission of power to wheels is great problem; kind of Diesel best adapted to railroad work.

Swedish Diesel Locomotive with Fluid Coupling, J. W. Morton. Oil Engine Power, vol. 6, no. 2, Feb. 1928, pp. 117–119, 3 figs. Description of Rosen locomotive drive; new fluid transmission used as reversible transmission gear, as elastic gear in connection with operation of clutch, or as medium for both purposes; suitable for service where elastic drive, without impact, is required as link between power-delivery unit and drive such as is used on locomotives, vehicles, or machine tools; consists of pump and motor inter-connected through piping in which valve housing is interposed; mineral oil as transmission medium; data on buckets.

Trials of Lomonossof Diesel Locomotives with Mechanical Transmission (Essais de la locomotive Diesel, à transmission mécanique, du Professeur Lomonossof), N. Dobrowolski. Revue Generale des Chemins de Fer, vol. 47, no. 1, Jan. 1928, pp. 59–63, 5 figs. Trials in laboratory at Duesseldorf; trials on tracks of Government Railroad in Germany; traction effort was superior to Diesel-electric locomotive and steam locomotive; comparison of weights per hp.

Electric. See ELECTRIC LOCOMOTIVES.

Feedwater Heating. The Willans-Luard System. Locomotive Superheating and Feed Water Heating (supp. to Locomotive, Jan. 14, 1928), pp. 132–138, 9 figs. System makes use of exhaust steam, exhaust flue gases and live steam which would be wasted at safety valves.

4-8-4. Five 4–8–4 Type Locomotives for the D. L. & W. Ry. Mech. Engr., vol. 102, no. 1, Jan. 1928, pp. 4–6, 3 figs. Total weight on drivers, 269,000 lb.; develop tractive force of 64,500 lb. with 77-in. drivers; description of new locomotives for D. L. & W. R.R. for use on heavy limited passenger-train service; table of dimensions, weights and proportions; novel arrangement for limiting cut-off is used, to be patented.

Gasoline-Electric. The Gebus Gasoline-Electric Locomotive (Motorlokomotiven mit elektrischer Kraftuebertragung, System "Gebus"), O. Judtmann. Zeit. des Osterr. Ingenieur- un. Architekten-Vereines, vol. 80, no. 1–2, Jan. 6, 1928, pp. 4–7, 6 figs. General description of narrow-gage and standard-gage gasoline-electric locomotives equipped with four-cylinder gasoline engine of 120 hp. and an 80-kw. shunt dynamo; also description of standard-gage locomotive of this type equipped with overhead pantograph trolley.

High-Pressure. The Schmidt-Henschel High Pressure Locomotive. Engineer, vol. 145, no. 3758, Jan. 20, 1928, pp. 80–82, 4 figs. Details of high-pressure, two-pressure locomotives built by Henschel & Sohn to carry out invention of Schmidt; feature of this engine is use of boiler which generates steam at two pressures, one in neighborhood of 900 lb. and other of 200 lb.; high-pressure steam, which is generated by Perkins closed-circuit method, is used in single high-pressure cylinder, and, on exhausting, is mixed with low-pressure steam and admitted to two outside cylinders; includes tabulated results of road tests.

Superheater. Brief History of the Locomotive Superheater. Locomotive Superheating and Feed Water Heating (supp. to Locomotive, Jan. 14, 1928), pp. 12–21, 16 figs. Principal attention is given to those apparatus which have been employed in actual service, including: Hawthorn, McConnell, Aspinall, Schmidt smokebox and fire-tube superheaters, Clench and other types of superheaters; Vauclain or Baldwin, Phoenix, Drummond, and Buck-Jacobs or Santa Fe superheaters; progress of fire-tube superheater; Cusack-Morton superheater.

Switching. Eight-Wheel Switchers for B. & M. Ry. Age, vol. 84, no. 5, Feb. 4, 1928, pp. 325–326, 2 figs. Develop tractive force of 56,800 lb. with boiler pressure of 250 lb.; have feedwater heaters, articulated main rods and snow melting devices; special materials are largely used for machinery parts with view of insuring ample strength for severe service, with minimum weight; details of dimensions, weights and proportions are given in a table.

2-8-4. 2–8–4 Type Locomotives of the Chicago & North Western. Ry. and Locomotive Eng., vol. 40, no. 12, Dec. 1927, pp. 347–348, 1 fig. Develop 79,500 lb. tractive effort with booster; description of Chicago & North Western locomotives built by American Locomotive Co.; table of weights and dimensions; weight complete 397,000 lb.

Vibration. Relation Between Bearing Springs and Vertical Vibration of the Steam Locomotive, K. Musashi. (Japan) Dept. of Railways—Bul., vol. 15, no. 11, Nov. 1927, pp. 1801–1823, 15 figs. (In Japanese.)

LOOMS

Wool. Adjusting the Eccentric Motion and the Center Filling Stop Motion of the Wool Automatic Loom, B. F. Hayes. Textile World, vol. 73, no. 4, Jan. 28, 1928, pp. 31 and 34, 1 fig. Advice to loom fixers as to importance of eccentric motion adjustment of wool automatic looms; attention to former will reduce smashes, broken sticks, and damaged boxes; false stopping.

LUBRICANTS

Tapping. Lubricants for Tapping, A. L. Valentine. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 418–420, 2 figs. Proper lubrication for tapping and its importance to cutting qualities and length of life of tap; power required varies considerably with different lubricants; kerosene for tapping aluminum; recent experiments on lubricants; reason for chips clinging to taps; different methods of sharpening taps; tap dull when it begins to slip in holder or chuck; necessary to sharpen taps in time; rounded off corners should not be permitted to become greater than chip thickness.

LUBRICATING OILS

Aircraft-Engine. A-M-L-O Lubricating Oil, F. D. Bostoph. Aviation, vol. 24, no. 5, Jan. 30, 1928, pp. 261–262, 1 fig. New product with all advantages of coming from pure paraffin base crude oil; 100 per cent wax-free; can be used in all weather; developed by Texas Pacific Coal and Oil Co.; forms instant film over all moving parts at starting temperatures, regardless of weather; high viscosity and exceptional purity.

M

MACHINE DESIGNERS

Training. Training of Machine Designers (Beitraege zur Konstrukteurerziehung), A. Erkens. V.D.I. Zeit., vol. 72, no. 1, Jan. 7, 1928, pp. 17–21, 23 figs. Proposes special training course for machine designers; analyzes process for designing standard machine parts to determine subjects of study such course need comprise.

MACHINE SHOP

Equipment Replacement. What Modern Equipment Has Done, C. R. Britten. Am. Mach., vol. 68, no. 5, Feb. 2, 1928, pp. 201–204, 9 figs. Actual results achieved at plant of Monroe Calculating Machine Co. by replacing obsolete with up-to-date equipment; policy that replacement equipment must pay for itself within year; reducing surface-grinding operations; transfer from 4-spindle drilling machine to multiple-drilling head; savings in cutting gear teeth; centerless grinding; screws made on cold-heading and thread-rolling machines; automatic cadmium-plating outfit; improvement in quality of product.

MACHINE TOOLS

Automatic. Factors Controlling Design of the Automatic Machine, H. W. Rupple. Am. Mach., vol. 68, no. 5, Feb. 2, 1928, pp. 213–214. Problem of fitting every machine to job; standardization of product in production plants has made opposite condition necessary to machine-tool builder; entire machine built around single part machine is intended to produce; synchronizing operations on different spindles of multi-spindle machines; rotating of tool positions in turret at different speeds offers saving.

Ball Bearings for. Applications of Ball Bearings to Machine Tools. West. Machy. Wld., vol. 19, no. 1, Jan. 1928, pp. 17–20, 10 figs. Variety of machine-tool equipment showing adaptability and wide range of application of New Departure ball bearings; all conditions of thrust and radial load or any combination of two provided for; application to drilling machines; anti-friction bearings in multiple-spindle drill for countershaft support; ball bearings applied to vertical high-speed shaft used in vertical-spindle surface grinder; design for lathe head used successfully on heavy-duty machines; ball-bearing center for very light high-speed work; small high-speed center using single-row ball bearings.

Direct-Current Drive. Advantages of D.C. Drive for Machine Tools, R. C. Deale. Am. Mach., vol. 68, no. 5, Feb. 2, 1928, pp. 211–212, 2 figs. Adjustable-speed d.c. motors compared with constant-speed a.c. motors having mechanical speed changes; speeds stamped on graduated dial fastened to body of field rheostat; mechanics pay little attention to actual spindle speeds but are guided by appearance of chip and finish of work; never same ease in changing speeds mechanically; complications in changing gears; advantage of adjustable speed where machine is operated any considerable portion of time.

Electric Control. Modern Machine Tools with Electric Control (Les machinesoutils

modernes avec commande electrique incorporée), G. Weinstein. Electricité et Mécanique, no. 21, Nov.-Dec. 1927, pp. 16–21, 9 figs. General description of recent incorporation of electric control on machine tools and shoe-making machinery, citing milling machines, vertical and radial drilling machines, lathes, shoe-soling and finishing machines; principles and method of control are described and their advantages explained.

Stop Mechanisms. The "Beaver-Tail" Stop, E. V. Crane. Machy. (N. Y.), vol. 34, no. 6, Feb. 1928, pp. 421–424, 6 figs. Design and operation of beaver-tail stop mechanism; used to prevent or minimize inertia shock or impact at some point in repeated cycle where clutch is thrown or tools are brought into contact with each other or with work; application to power presses; use in removing impact load from tools; size of driven gear; construction of profile of beaver-tail cam; beaver-tail cam without dwell.

MAGNESIUM ALLOYS

Properties. Magnesium Alloys, J. A. Gann and A. W. Winston. Metallurgist (supp. to Engineer), Jan. 27, 1928, pp. 4–6. Deals with technique of methods used by Dow Chemical Co. in manufacture of magnesium alloys and properties of these alloys; authors claim that much of corrosion trouble previously encountered in magnesium alloys has been overcome by use of purer metal and elimination of sponginess in castings by improved technique. Abstract of paper published in Indus. and Eng. Chem., Oct. 1927.

MATERIALS HANDLING

Equipment. Mechanical Handling in Industry (Les manutentions mécaniques dans l'industrie), E. Pacoret. Vie Technique et Industrielle, vol. 10, no. 100, Jan. 1928, pp. 56–61. Latest improvements affecting applications of modern materials handling; handling of coal such as storing, unloading; mechanical handling in ports; car haulage, conveyors and transporters, belt conveyors, screw and gravity conveyors, monorails, hoist.

Factors in. Eight "Slants" on the Problem of Handling Materials, F. L. Eidmann. Can. Machy., vol. 39, no. 1, Jan. 12, 1928, pp. 46–47. Author gives general review of situation and effect of certain conditions on proper handling of materials such as weight of material, influence of design of plant, influence on inventory, selection of equipment, safety to workers, coordination and flexibility and return on investment.

Scheduling. Mechanical Scheduling, H. V. Coes. Factory, vol. 75, no. 1, Jan. 1928, pp. 52–54, 2 figs. Material handling's important part in cutting costs and speeding turnover; transferring overhead to capital account; reducing process inventory; automatic mechanical scheduling.

METAL SPRAYING

Coating by. Coating by Molten-Metal Spraying. Machy. (Lond.), vol. 31, no. 797, Jan. 19, 1928, pp. 505–510, 14 figs. Developments in coating either metallic or non-metallic parts with any metal to obtain protection against atmospheric corrosion or chemical action; method of spraying molten metal on surface to be coated; how metal-spraying tool is applied; coating or enlarging cylindrical parts; coating inner surfaces of tubes; coating small parts in bulk; some general applications of metal-spraying process.

METALS

Fatigue. Repeated-Stress Endurance of Metals. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 289–291. Modern viewpoint of fatigue failure pictures metal yielding first at some point of localized weakness; it is study of elastic straining and of spreading cracks, rather than of plastic straining; design of specimens for fatigue tests; effects of speed of testing on endurance limit; physical properties; threads, shoulders and fillets; welded joints; locating cracks. From Manual, by H. F. Moore, issued by Eng. Foundation.

Machinability. Determination of the Machinability of Materials and the Wear Resistance of Cutting Tools (Die Bestimmung der Bearbeitbarkeit der Werkstoffe und des Abnutzungswiderstandes der Schneiderwerkzeuge), W. Leyensetter. Maschinenbau, vol. 6, no. 24, Dec. 15, 1927, pp. 1177–1184, 16 figs. Description of pendular cutter designed for quick determination of workability, cutting pressure, wear of cutting surfaces, economy effected by utilizing results of such tests may reach 15 or 20 per cent.

MILLING CUTTERS

Sharpening. Getting Greater Production Through the Proper Sharpening of Tools and Cutters, F. B. Heitkamp. West. Machy. Wld., vol. 19, no. 1, Jan. 1928, pp. 9–11, 8 figs. Design and use of milling cutters; proper sharpening methods and equipment to turn out product of better finish and in greater quantity; tools should be sharpened frequently; milling cutters made on two principles; each class sharpened by methods peculiar to itself; prime importance of suitable rake angle; method of obtaining rake angle; whenever possible spiral mills should be ground with disk wheel.

MOTOR TRUCKS

Design Trends. Improvements in Truck Construction Provide More Speed and Flexibility, D. Blanchard. Operation and Maintenance, vol. 37, no. 1, Jan. 15, 1928, pp. 10–11 and 36, 10 figs. Trend of truck design briefly discussed; six-cylinder engines and pneumatic tires; transmissions with four or more speeds increasing; four-wheel brakes; increased comfort for driver in type of cab, supporting of cab and more powerful steering gears; increased compression ratios; aluminum pistons; air cleaners, oil filters and fuel strainers regular equipment; bevel-reduction rear axles; no reduction in chassis weight.

Wheels, Manufacture of. Methods and Equipment Used in the Manufacture of Steel Wheels. West. Machy. Wld., vol. 19, no. 1, Jan. 1928, pp. 6–8, 8 figs. General handling of cast-steel wheels in machine plant of Kay Steel Wheel Co.; important features of wheel; type K dual pneumatic steel wheel for Goodyear rim equipment; Kay spider wheel brought out for use in place of disk wheels; machine-shop operations; flat end gages for checking diameters of seats bored for bearings in hubs; limit gages for diameters of felloes, bevel surface, width of wheel face, and spacing between bevels on rim.

N

NOZZLES

Steam, Flow in. Fifth Report of the Steam-Nozzles Research Committee. Engineering, vol. 125, no. 3237, Jan. 27, 1928, pp. 116–119, 7 figs. Decision of Committee to carry out investigation into efficiency of nozzles at different pressure ranges from those covered by first four reports involved alteration in back pressure against which nozzles discharged; superheater and rearranged pipe work; rearrangement of pressure-measurement apparatus; preliminary tests. (To be continued.) See also editorial comment, pp. 107–108.

The Dimensional Theory of Steam Nozzle Flow, J. C. Oakden. Engineering, vol. 125, no. 3236, Jan. 20, 1928, pp. 80–82. In case of flow of gas or steam through nozzle, quantities of greatest practical interest are efficiency and discharge coefficient of nozzle; for nozzle of definite geometrical shape and roughness, efficiency may depend upon value of any or all of following quantities; size of nozzle; initial pressure of gas; ratio of pressures of gas before and after passing through nozzle; initial absolute temperature; viscosity and adiabatic index of gas, etc.

O

OIL ENGINES

Experiments. Some Fuel Experiments in a Mechanical Injection Oil Engine, E. L. Bass. Diesel Engine Users Assn.—report for mtg., Oct. 7, 1927, 25 pp., including discussion, 14 figs. Statement of fact founded upon research conducted on particular grade of residue fuel; apparatus for experiments was 32-b.hp. Crossley cold-starting oil engine; tests were carried out with centrifuged fuel of Venezuelan origin; further similar series of tests on another fuel called light Venezuelan very similar to that previously tested, but lower asphalt content.

Marine. The Marine Oil-Engine, C. J. Hawkes. Engineering, vol. 125, no. 3235, Jan. 13, 1928, pp. 39–41; and Engineer, vol. 145, no. 3757, Jan. 13, 1928, pp. 40–42. Author believes that much can be expected in future developments of large oil engines; he considers Still engine most efficient for marine purposes at present time; results of tests by Marine Oil Engine Trials Committee on Still and Doxford airless-injection engines and comparison of performances of these two; trunk pistons are unsuitable for high-speed 2-stroke engines; comparison of 4-stroke and 2-stroke cycles; problems of supercharging. Lecture read before Inst. Mech. Engrs.

OPEN-HEARTH FURNACES

Control. The Open Hearth Furnace in Leash, G. A. Merkt. Blast Furnace and Steel Plant, vol. 16, no. 1, Jan. 1928, pp. 41–45, 7 figs. Isley furnace control as installed by Morgan Construction Co. in number of open-hearth furnaces; patented device is ingenious arrangement of power apparatus by regulation of which supply of elements of combustion as well as removal of their products may be altered at will to any degree of activity and accuracy desired; while Isley control apparatus produces mechanical draft of definitely adjustable value, there are no moving parts exposed to high temperature.

Design. Changes in Open-Hearth Design and Practice During 1927, W. J. Priestley. Iron Age, vol. 120, no. 1, Jan. 5, 1928, pp. 37–38, 1 fig. Steel operators analyzed chemistry of their melting practice and sought means to reduce their costs without sacrificing quality of their steel; research in physics of steel; advances in furnace design—preheaters for air, sloping back wall, and Isley furnace; production of acid steel—experience of cable maker; residual silicon to be avoided; slag low in iron important; high-manganese pig in basic open-hearth; rigid testing reacted favorably.

OXYACETYLENE CUTTING

Foundries. Notes on Oxy-Acetylene Cutting in Foundries, C. H. S. Tupholme. Foundry Trade Jl., vol. 37, no. 592, Dec. 22, 1927, p. 216. Points out that proper use of oxyacetylene cutting flame has enabled many foundry managers to reduce their rejections, and flame, when employed for cutting risers, has exerted an important influence on casting practice; cutting flame may play important part in reclamation of defective castings, particularly where defect is minor in degree, such as blowhole, shrinkage crack or part of lug missing; another opportunity to use flame for reclamation is in case of aluminum castings.

OXYACETYLENE WELDING

Procedure Control. Procedure Control in Welding a Storage Tank. Sheet Metal Worker, vol. 18, no. 24, Dec. 30, 1927, pp. 921–923, and 929, 8 figs. Considerations involved in fabricating tank of $^3/_{16}$-in. plate, to hold 1500 gal. of fuel oil under gravity pressure; check on welders; qualification tests; design and layout of welded joints; preparation of plates for welding; welding technique; test of completed tank. (Reprinted from Oxy-Acetylene Tips.)

Stampings. Stampings Welded into Complex Units, A. G. Wikoff. Iron Age, vol. 121, no. 5, Feb. 2, 1928, pp. 321–324, 9 figs. Construction of Servel refrigerators; entire device made of thin-walled tubing and sheet-metal stampings, with all joints welded; oxyacetylene welding used almost exclusively in construction, because especially suitable in making gas-tight joints; essential that complex system of pipes and chambers be absolutely tight; moderate investment in machines and equipment produces compact, efficient and reliable parts; liquid heat exchangers; hydrogen circuit assembled; final assembly and test.

P

PIPE, CAST IRON

Welding. Bronze Welding Cast Iron Pipe by Back-Stepping Method, H. Y. Carson. Iron Trade Rev., vol. 82, no. 2, Jan. 12, 1928, pp. 138–139, 6 figs. Bronze welding not only simplifies and reduces cost of complicated fittings such as manifold illustrated, but also is being used more extensively for general repair work. Paper presented before Am. Water Works Assn.

PLATES

Flat, Deflection of. The Deflection of Flat Plates Fixed at the Circumferences, H. Carrington. Engineering, vol. 125, no. 3235, Jan. 13, 1928, pp. 31–32, 6 figs. Gives results which were obtained with view to determining experimentally more precisely, effects of strains in middle surface and approximate ratio of deflection to thickness at which Poisson's theory ceased to apply; same plate was used throughout experiments; it was of annealed mild steel 0.62 in. thick and 26.5 in. in diameter; conclusions drawn for circular elastic plates fixed at circumference and deflected at uniform pressure.

PLYWOOD

Gluing Materials. Blood Albumen and Its Use as a Cementing Material for Gluing of Plywood and Veneering Woods (Ueber Blutalbumin und seine Verwendung als Bindemittel in der Furnier- und Sperrholzverleimung), H. Stad-

linger. Chemiker-Zeitung, vol. 52, no. 3, Jan. 11, 1928, pp. 35–36. Comparative discussion of wood-gluing materials; production of blood albumin, its applications in industries, use in wood industry, research problems.

POWER PLANTS, DIESEL

Equipment. Modern Steam Plant Gives Place to Diesel Power. Oil Engine Power, vol. 6, no. 2, Feb. 1928, pp. 98–100, 6 figs. Successful municipal oil-engine central station operating under highly competitive conditions; plant of City of Cedar Falls, Iowa; savings on oil engine sufficient to finance purchase of another oil engine; McIntosh-Seymour 750-hp. Diesel engine; water-works equipment; engines installed of 4-stroke cycle, air-injection, trunk-piston type direct-connected to General Electric alternators with exciters driven by silent chains; Bowser pressure lubricator; exhaust discharges through Maxim silencer.

New York. A Diesel Plant in Metropolitan New York, G. Grow. Power, vol. 67, no. 3, Jan. 17, 1928, pp. 98–100, 3 figs. Details of 1060-hp. Diesel plant of Gates Co. supplying energy used in lumber yard and planing mill; two 18,000-gal. fuel-oil storage tanks were provided and embedded in concrete in accordance with New York City Fire Underwriters Laws; three 360-hp. Diesel engines were installed each direct connected to 300-kva. 40-deg. 3-phase 60-cycle 440-volt engine-type alternator, together with direct-connected 10-kw. exciter for each alternator.

POWER PLANTS, HYDROELECTRIC

Bellows Falls, Vt. Sixty Thousand Horsepower from the Connecticut River, R. G. Skerrett. Compressed Air Mag., vol. 33, no. 2, Feb. 1928, pp. 2305–2310, 21 figs. Construction of plant at Bellows Falls, Vt.; power drawn from Connecticut River to generate large block of electric energy for New England; effective head of about 60 ft. to drive 3 single-runner wheels, each capable of producing 20,000 hp.; dam crossing Connecticut River in straight line; modernizing of canal; excavating for power house and tailrace; compressed air for drilling, operating pumps and blacksmith-shop equipment.

Conowingo, Md. The Conowingo Hydro-Electric Development on the Susquehanna River, H. A. Hageman. Am. Soc. Civ. Engrs.—Proc., vol. 54, no. 2, Feb. 1928, pp. 667–671. Sets forth in somewhat greater detail, design of major parts of structure and operating equipment; trash racks; gantry cranes; waterwheels; draft tubes. Discussion on paper by A. Wilson continued from Nov. 1927, issue of Proceedings.

Low-Head. Low-Head Plant at the Falls of the Ohio to Produce 100,000 Kw. Power, vol. 67, no. 6, Feb. 7, 1928, pp. 232–236, 9 figs. Under heads of 37 to 10 ft., this plant was designed to utilize widely varying flow of Ohio River at Louisville, Ky.; turbines of propeller type and generator stators of welded steel-plate construction have effected reduction in size and weight of units and in power-plant cost; economy is maintained by operating generators star-connected above three-quarter load and delta connected for loads below this rating.

POWER PLANTS, STEAM

Equipment, Reconditioning. $60,000 per Year to Be Saved by Revamping Old Power Plants, J. J. Daley. Power, vol. 67, no. 5, Jan. 31, 1928, pp. 170–174, 7 figs. By reconditioning equipment that had been in service for years in two distinct plants, shutting down one boiler room and raising settings in other, improving water supply and purchasing current during summer, an efficient plant was produced that will effect saving in operating expense exceeding $60,000 per year.

High-Pressure. Industrial Production of High-Pressure Steam (La production industrielle de la vapeur d'eau à haute pression), C. Roszak and M. Vernon. Chaleur et Industrie, vol. 8, no. 92, Dec. 1927, pp. 703, 4 figs. Treats of addition to central station of Issy-les-Moulineaux (Paris) describing turbines, boilers, feeding and auxiliary machinery; discusses also various types of boilers with small reservoirs, marine boilers and double-circuit boilers.

Modern German High-Pressure Steam Plants. Eng. Progress, vol. 9, no. 1, Jan. 1928, pp. 22–24, 6 figs. Application of Benson process at Siemens-Schuckert Works, with generator producing 66,000 lb. of steam per hr. at pressure of 180 atmos.; trial plant at Vienna Locomotive Works uses Loeffler system operating according to indirect process of evaporation; water in boiler is heated by superheated steam; Schmidt indirect process differs from Loeffler process chiefly in that internal heating of boiler is effected by continuous stream of distilled water; it has been adopted on German locomotive; Blomquist process employs tubes exposed to fire which continuously revolve around their own axis.

Operating Experiences with 1200-lb. Steam Pressure, J. Anderson. Engineering, vol. 125, no. 3234–5, Jan. 6 and 13, 1928, pp. 25–28, 7 figs., and 55–58, 5 figs. Jan. 6: Experience with high-pressure installation at Lakeside Station, Milwaukee; certain major troubles have been experienced which are described in detail; scale trouble; characteristics of failures; tube-strength calculations; loss of tensile strength in service; results clearly show either that raw water must be excluded from system and scale limited to $^1/_{32}$-in. thickness or that tubes of high strength must be substituted for low-carbon steel tubes exposed to furnace. Jan. 13: Treatment of feedwater; characteristics of corrosion failures; loss of turbine capacity; deposits cause turbine trouble; scale and corrosion prevention; concludes that though higher pressure imposes more exacting requirements upon boiler materials, safe and continuous operation is possible.

POWER PLANTS, STEAM-ELECTRIC

Klingenberg, Berlin, Germany. Auxiliary Equipment of the Klingenberg Power Plant (Die Hilfsmaschinen des Grosskraftwerkes Klingenberg), H. Denecke. V.D.I. Zeit., vol. 71, no. 53, Dec. 31, 1927, pp. 1877–1887, 20 figs. Live-steam piping; materials of construction; types of flange joints for maximum of 37 atmos. pressure at 425 deg. cent.; feedwater piping and pumps; treatment and preheating of feedwater, regulation of preheating; CO_2 fire protection for electric motors; oil tanks and oil storage for turbines and transformers.

Mechanical Equipment of the Klingenberg Power Plant (Weiteres vom Grosskraftwerk Klingenberg in Berlin-Rummelsberg, Maschineller Teil), F. Muenzinger. Electrotechnische Zeit., vol. 48, no. 1, Jan. 5, 1928, pp. 5–12, 17 figs. Detailed description of vertical tubular boilers, coal-pulverizing plant and 4-stage condenser turbines, 80,000 kw. capacity, 1500 r.p.m., of new 540,000-kw. steam-electric plant supplying electric power to greater Berlin.

The Klingenberg Power Station, Berlin. Engineering, vol. 125, no. 3235, Jan. 13, 1928, pp. 58–59. Station has capacity of 270,000 kw. and is supplying about 50 million kw-hr. per month; thermal efficiency is 20.9 per cent; equipment for handling and treating fuel; steam pressure and temperature employed were chosen as result of careful investigations, pressure of 35 atmos. abs. and temperature of 425 deg. cent. being finally selected; all combustion air is preheated; generating plant proper consists of 3 sets, each having output on continuous rating of 100,000 kva.

The Klingenberg Power Plant (Das Grosskraftwerk Klingenberg), M. Rehmer. V.D.I. Zeit., vol. 71, no. 53, Dec. 31, 1927, pp. 1829–1830, 3 figs. General introductory remarks on function and capacity of plant and its principal equipment; statistics of electric power demand in greater Berlin for period 1918 to 1927; prediction of demand in near future indicating load of from 483,000 to 791,000 kw. in 1930.

So. Cal. Edison Co. Construction of Steam Plant No. 3, W. D. Campbell. Nat. Engr., vol. 32, no. 1, Jan. 1928, pp. 1–3, 2 figs. Construction details of Southern California Edison Co.; this will be first of unit of new million-horsepower plant at Long Beach; with completion of new plant, Terminal Island will be greatest power-generating center in world; steam turbines; boilers; condensers.

Steam Plant Development of Southern California Edison Company, R. Wilcox. Power, vol. 67, no. 4, Jan. 24, 1928, pp. 130–134, 4 figs. Third steam plant of company that eventually will have capacity of 1,000,000 kw. now under way; tandem-compound turbine rated at 94,000 kw. will be one of largest in operation and boilers having individually more than 34,000 sq. ft. of surface will be largest used for power purposes; flow diagrams for three steam stations show advance made in power-plant design.

PRESSURE VESSELS

Welding. Control in Pressure Vessel Welding, H. E. Rockefeller. Heat Treating and Forging, vol. 14, no. 1, Jan. 1928, pp. 34–37, 3 figs. Describes material used and methods pursued in fabricating by welding six pressure vessels each six ft. in diam. and designed for working pressure of 300 lb.; results of tensile tests on qualification test specimens; preparation of material for welding; welding longitudinal seams; presents table of strain measurements. Paper presented before Int. Acetylene Assn.

Procedure Control in Pressure Vessel Welding, H. E. Rockefeller. West. Machy. Wld., vol. 19, no. 1, Jan. 1928, pp. 13–16 and 28, 5 figs. Methods used in constructing 6 large tanks designed for 300-lb. operating pressure; design of vessel and welded joints; selection of material; check of welders; results of tensile tests on qualification-test specimens; preparation of material for welding; welding longitudinal seams; welding of manhole reinforcing ring to manhead; lining up and tacking head seams; welding head seam; providing ventilation; test of tank; factor of safety.

The Application of Welding to the Construction of Large Pressure Vessels, T. McL. Jasper. Boiler Maker, vol. 28, no. 1, Jan. 1928, pp. 8–9. Fundamentals of good welding; explanation of results obtained from long series of tests on arc-welded specimens of carbon steels having yield point from 30,000 to 35,000 lb. per sq. in. and ultimate strength of from 55,000 to 60,000 lb. per sq. in.

PRESSWORK

Formed Shells. Formed Shells Produced in Hydrostatic Dies, G. P. Anthes. Am. Mach., vol. 68, no. 5, Feb. 2, 1928, pp. 207–209, 4 figs. Tools and methods used in producing formed shells; drawing shell of suitable diameter and length from which to make desired stamping; bulging shell into required shape; blank drawn and redrawn in five operations; same punch holder and die shoe used for four subsequent reducing operations; die for performing bulging operations; heavy grade oil for filling shells before bulging.

PULVERIZED COAL

Burners. New British Burner Solves Short Flame Problem, D. Brownlee. Power House, vol. 22, no. 2, Jan. 20, 1928, pp. 33–34, 2 figs. Gives details of new "R" burner, invented by British firm, and in which, it is claimed, is contained solution of problem of completing combustion in flame of only short length; results of this is that combustion chamber can be cut down to about half size.

PUMPS, CENTRIFUGAL

Design. Function and Most Fitting Form of Casing for Centrifugal Pumps Working in Series (Considerazioni sulla maniera di agire della capsula e sulla forma piu conveniente da asegnarl eper le pompe centrifughe de serie), M. Medici. Industria, vol. 41, no. 23–24, Dec. 15–31, 1927, pp. 606–608, 5 figs. General theoretical discussion preliminary to projected series of experiments; author finds his ideas confirmed by experimental data recently published by Scherzer in his "New Theory for Centrifugal Pumps."

PUNCH PRESSES

Deflection. Spring or Deflection in Presses and Die, E. V. Crane. Iron and Steel World, vol. 1, no. 10, Nov. 1927, pp. 709–714, 5 figs. Influence of design upon deflection of frame and working parts of presses; arc spring causes heavy die wear and impressions which are not sharp due to alteration of clearances and bending; explains how, by correct selection of press, output of dies may be greatly increased, savings per year in die upkeep often exceeding several times price of press.

R

RAILWAY MOTOR CARS

Gasoline. Gasoline Motor Cars on French Systems (Les Automotrices à Essence sur les Réseaux Francais d'Interêt Local), M. Vergniole. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 252, Dec. 1927, pp. 546–568 and (discussion) 569–570, 28 figs. Geographical distribution in France of gasoline motor cars and characteristics of various types; engines, gear boxes, axles, wheels, brakes, weight, etc. are taken up, also gas-electric cars; tendencies of design. Report presented at Fourth General Technical Assembly, Marseille.

RAILROADS

Repair Shops, Equipment. Electricity in a Modern Railroad Shop, E. Sheldon. Am. Mach., vol. 68, no. 5, Feb. 2, 1928, pp. 215–217, 5 figs. Electric transmission of power and autogenous fusion of metals in main shops of Boston & Maine Railroad; two bridge cranes to lift heaviest locomotives; machine tools driven by individual motors; storage-battery trucks; outlets for oxygen and acetylene gases and portable gas outfits mounted on trucks; reversible hydraulic drive for rotating driving wheels of locomotive while setting valves; resistance-welding machine for welding safe ends on boiler flues.

Railway Wheel Repair Shop Has Some Unique Features, D. M. Duncan. Can. Machy., vol. 39, no. 2, Jan. 26, 1928, pp. 21–23, 6 figs. Special machines for handling repairs for both passenger and freight-car wheels and axles; equipment in West Toronto plant of Canadian Pacific Railroad; lathe for turning axles; lathe sunk into floor;

wheels rolled off machines with minimum of effort; vertical boring mill for boring central hole to take axle; pressing wheels on and off; upper and lower limits set; lathe for turning steel rims of passenger car wheels.

Signals and Signaling. Power Requirements of Rail Circuits of Automatic Railway Signaling Systems (Der Energiebedarf des Gleisstromkreises der selbsttaetigen Signalanlagen), H. Arndt. Siemens-Zeit., vol. 7, no. 12, Dec. 1927, pp. 797–809, 13 figs. Theoretical, mathematical discussion of power consumption by single-phase polyphase block relays; vector diagrams; examples from practice.

Signaling of L. A. & S. L. Completed in 1927. Ry. Signaling, vol. 21, no. 1, Jan. 1928, pp. 5–8, 7 figs. Latest construction includes a.c. floating system with line transformers at stations only; type and equipment used on signaling installed in 1927; a.c. floating system; unique a.c. distribution; signal foundations precast; signal construction; cost of installation $3010 a mile.

REFRIGERATING COMPRESSORS

Design. Refrigerating Compressors—Their Design and Application, T. M. Gunn. Power House, vol. 22, no. 1, Jan. 5, 1928, pp. 25–29, 11 figs. Space requirements; speed of compressors; when compressors pound; clearance pockets; methods of regulation; separates hot and cold parts; dual back-pressures.

Large. Compressors for Large Refrigerating Plants, H. Voigt. Information on Refrigeration (Institut Int. du Froid)—Monthly Bul., no. 9–10, Sept.-Oct. and Oct.-Nov. 1927, pp. 844–848. Two compressors which have no equal in power in world are at present working at Glauber Salts factory belonging to Kaiseroda Establishments of Kali-Industrie A.G. of Cassel; one is piston compressor constructed by Sulzer Bros. of Switzerland, two-stage horizontal machine with cylinders in tandem; other is turbo-compressor built by Brown Boveri Co. of Switzerland, with hourly production from 6 to 8 million frigories. Translated from V.D.I. Zeit., vol. 71, no. 33.

REFRIGERATING MACHINERY

Ammonia Control Valves. Automatic Ammonia Control Valves, H. G. Venemann. Refrigeration, vol. 43, no. 1, Jan. 1928, pp. 46–50, 12 figs. Study of conditions affecting control valves and why no automatic valve can be made that will function properly under all of them; four types of automatic control valves in common use: stop valves, constant-pressure valves, constant-liquid level valves, load-demand valves.

REFRIGERATION

Dry-Ice (CO_2). The Field of Dry Ice in Modern Refrigeration, J. W. Martin, Jr. Refrig. Eng., vol. 15, no. 2, Feb. 1928, pp. 33–34, 43 and (discussion) 55, 2 figs. Probably most noticeable characteristic of solid carbon dioxide is its extremely low temperature, —109.3 deg. fahr., at atmospheric pressure, surrounded by its own gas; amount of heat that this ice is capable of absorbing is twice that absorbed in melting of water ice; method of producing carbon dioxide from burning of coke is by far the most important, but other methods are described, including: fermentation tubs, lime kilns, cement kilns, power-house flue gases, blast-furnace stoves, natural wells, chemical plants.

ROLLING MILLS

Blooming Mills. Power Requirements and the Rolling Capacity of Blooming Mills, C. Schmitz. Iron and Steel World, vol. 2, no. 1, Jan. 1928, pp. 21–26, 6 figs. For main investigation total power which was taken from line was measured in each case; results show that the larger the ingots, the larger is possible output; therefore, ingots should be made as long as possible up to 7 ft., especially if as large as 4 in. sq.; strength of auxiliary machinery, motor, roll tables and screw-down influence operation considerably, as well as speed with which rolling-mill motor can be reversed. Translated from Stahl u. Eisen.

Broad-Strip. The Evolution of the Broad-Strip Rolling Mill, S. Badlam. Iron and Coal Trades Rev., vol. 116, no. 3125, Jan. 20, 1928, pp. 69–70, 1 fig. Outstanding achievement of present decade; rolling of wide thin sections has developed along two distinct and originally widely separated lines: (1) rolling of strip, characterized by limitations in width and gage, rather than in length; (2) rolling of sheets, characterized by limitations in length, rather than in width and gage.

Chilled Rolls. Selection of Special Purpose Rolls, W. H. Melaney. Iron and Steel World, vol. 2, no. 1, Jan. 1928, pp. 45–46. Selection of rolls should be made according to particular service for which they are to be used; use of mild chilled and hard chilled rolls.

The Use and Abuse of Chilled Rolls, W. H. Melaney. Blast Furnace and Steel Plant, vol. 16, no. 1, Jan. 1928, pp. 12–15, 2 figs. Relates in concise form how rolls are manufactured and how they should be handled when in service; refers especially to sheet-mill rolls; chilled cast iron is most desirable because of its cheapness, its hard face and fact that heat it must stand in rolling sheets has very little effect in reducing hardness; physical characteristics.

Electric Drive. Electric Drives in the Steel Rolling Mills, A. F. Kenyon. Blast Furnace and Steel Plant, vol. 16, no. 1, Jan. 1928, pp. 24–27, 5 figs. Review of important installations on continuous and reversing mills, together with discussion regarding use of synchronous motors; includes table of mill-drive motors above 300 hp. furnished by Westinghouse Elec. & Mfg. Co. from Dec. 1, 1926, to Dec. 1, 1927.

Operation. Deformation in the Rolling and Forging Processes, G. Sachs. Iron and Steel World, vol. 2, no. 1, Jan. 1928, pp. 35–40, 8 figs. Tests approaching practical conditions show that tearing appearances in rolling of plates and shapes are caused by non-uniform material displacements. Translated from Zeit. fuer Metallkunde.

Speed Control. Accurate Control of Rolling Speeds. Iron Age, vol. 121, no. 5, Feb. 2, 1928, pp. 325–327, 4 figs. New Bourne-Fuller electrically driven rolling mill; close regulation of rolling speeds; individual magnetic control for each mill motor; individual balance-type vibrating speed regulators maintain correct speed set; bars kept under tension but not stretched or looped between passes; mill for rolling both alloy and plain carbon-steel bars produces strip, bands, angles and spring steel in straight lengths and coils; heating furnace has suspended roof; 8 roughing mills in 2 sets of four; 3 motors drive 4 finishing stands; automatic control beyond last finishing pass.

Tube Mills. Diagonal Rolling of Billets into Seamless Tubes. Iron and Steel World, vol. 2, no. 1, Jan. 1928, pp. 15–20 and 26, 5 figs. Interpretation of mathematical calculations by use of three-dimensional diagrams; conclusions to be drawn from mathematical investigations.

S

SEAPLANES

Design. Seaplanes—Fifteen Years of Naval Aviation, A. Guidoni. Royal Aeronautical Soc.—Jl., vol. 32, no. 205, Jan. 1928, pp. 25–64 52 figs. Theory and calculation of hydrovaned floats; early seaplanes; work of Forlanini and Crocco; theory of seaplane floats; author's own researches; shape of hydrovaned floats; area, angle of attack and form of hydrovanes; advantages and inconveniences of hydrovanes; practical applications.

Dornier. The Large Dornier Seaplane "Superwal." Eng. Progress, vol. 9, no. 1, Jan. 1928, pp. 1–3, 4 figs. Developed from Wal type by increasing its dimensions to suit heavier service requirements; all structural parts are made of metal; highly stressed parts of steel and others of duralumin; fuselage of 81 ft. length is designed as boat with stepped-up bottom; each half-wing consists of three parts; fore cabin can seat 11 to 13, rear cabin 8 persons; two 650-b.hp. Rolls-Royce engines are placed in one car, one behind other, and located above wing.

SEMI-STEEL CASTINGS

Machine Parts. Casting Semi-Steel Machine Tool Parts at Galt, E. G. Brock. Can. Machy., vol. 38, no. 26, Dec. 29, 1927, pp. 182–184 and 187, 4 figs. History and manufacture of Canada Machinery Corp.; semi-steel used for parts; semi-steel castings eliminate warping; foundry practice; large castings made in green sand; means of dropping cupola bottom after daily heat; several steps in process of molding 10-ton bulldozer frame; hard dry sand gate; reinforcing with rods; spacious core room; conditions in plant reflected in product.

SPEED REDUCERS

Automobile-Engine. Berliet Speed Reducer. Automotive Abstracts, vol. 6, no. 1, Jan. 20, 1928, p. 17. Device intended to give small European engines flexibility of American ones; object is accomplished by internal gear set placed between engine and usual transmission; this internal gearing changes overall speed reduction from 1:5 in direct to 1:75; thanks to silence of internal gearing it is claimed that one hardly realizes that car is not in high; intended for regular use on bad roads, in traffic, etc. Brief translated abstract from Omnia, Nov. 1927.

STEAM

High-Pressure. Recent High Pressure Development in Germany, Loeffler. Power Plant Eng., vol. 32, no. 3, Feb. 1, 1928, pp. 178–179, 2 figs. Pressure above 1500 lb. and block steam plants for power and municipal heating service are believed to be most economical; examples of new turbines using extremely high pressure; turbines are preferable to engines in large buildings. Abstract translated from V.D.I. Zeit.

STEAM ENGINES

Uniflow. The Uniflow Steam Engine, E. A. Allcut. Eng. Jl., vol. 11, no. 1, Jan. 1928, pp. 3–11, 16 figs. General notes including historical reference, results of tests, its application and bibliography of subject.

STEAM GENERATORS

Design. The Steam Generator in Service, G. Burgess. Power, vol. 67, no. 6, Feb. 7, 1928, pp. 245–247, 5 figs. Ideal steam generator, in author's opinion, would provide high average heat-transfer rate for all surfaces; to effect this condition, it would be necessary that every tube receive maximum heat effect; intimate mixture of fuel and air secured by turbulence in furnace greatly accelerates combustion and permits reduction in excess air; hence, there is definite trend toward turbulent action in design of pulverized-fuel burners and furnaces; increased combustion rates thus secured permit either higher ratings or smaller furnaces.

STEAM TURBINES

Back-Pressure. Back-Pressure Turbines (Les turbines à contre-pression), G. Vie. Vie Technique et Industrielle, vol. 10, no. 100, Jan. 1928, pp. 42–44, 2 figs. Treats of turbines whose exhaust is used for industrial purposes in mills and factories for heating or drying, cooking, etc.; explains regulation of speed and pressure and type of turbine used.

Design. New 40,000 Kilowatt Turbines for the Duquesne Light Company, J. D. Schmidt. Elec. Jl., vol. 25, no. 1, Jan. 1928, pp. 36–38, 5 figs. Turbines are connected to generators rated at 48,500 kva. at 80 per cent power factor; no direct connected exciters are provided; operating conditions are 260 lb. gage pressure at throttle with 214 deg. fahr. superheat and back pressure of one inch of mercury, absolute; arrangements are provided for bleeding turbines at four points for feedwater heating.

Stiffening Effect of Disks on Turbine Shafts (Versteifender Einfluss der Turbinenscheiben auf die Durchbiegung des Laeufers), B. Eck. V.D.I. Zeit., vol. 72, no. 2, Jan. 12, 1928, pp. 51–56, 13 figs. Develops formulas for stiffening effect of disks mounted on spindles of steam turbines and turbo-compressors; describes method of experimental determination of stiffening effect of disks (as many as 18) of integrally cast rotors, manufactured and tested by Frankfurter Maschinenbau A.G.

High-Pressure. Higher Steam Pressures, and Their Application to the Steam Turbine, A. H. Law and J. P. Chittenden. Instn. Elec. Engrs.—Jl., vol. 66, no. 373, Jan. 1928, pp. 89–117 and (discussion) 117–123, 31 figs. Sets out in simple form theoretical and practical gains which may be expected from any increases in pressure over as wide a range as possible; examples of high-pressure steam turbines are described and classified; effect of high pressures on design; reliability of high-pressure installations in operation and comparison with plants operating with more normal pressures.

Klingenberg Power Plant. The Turbines of the Klingenberg Power Plant (Die Turbinenanlagen im Grosskraftwerk Klingenberg), E. A. Kraft. V.D.I. Zeit., vol. 71, no. 53, Dec. 31, 1927, pp. 1869–1876, 54 figs. Design and construction of main four-stage, condenser turbines of 80,000 kw. capacity at 1500 r.p.m., of bleeder turbines of 10,000 kw. at 3000 r.p.m. and of 650-kw. turbines at 6000 r.p.m. for driving feedwater pumps.

STEEL

Alloy. See ALLOY STEELS.

Annealing. The Constitution of Steel and Cast Iron, F. T. Sisco. Am. Soc. Steel Treating—Trans., vol. 8, no. 2, Feb. 1928, pp. 305–317, 8 figs. Discusses three steps in annealing operation: (1) heating material to annealing temperature, (2) holding steel at proper temperature, and (3) cooling from annealing temperature; in each of these steps various structural changes taking place are discussed; operation of annealing as discussed is description of that process as it involves heating to temperature above critical range; includes photomicrographs and iron-carbon diagram, also diagram illustrating annealing of steel.

Chrome-Vanadium. See CHROME-VANADIUM STEEL.

Die. Some Suggestions for the Choice of Die-Steel, W. Oertel. Am. Soc. Steel Treating—Trans., vol. 8, no. 2, Feb. 1928, pp. 320–321. Required properties of die steel are high tensile strength and hardness up to temperatures from 752 to 932 deg. fahr., high resistance against softening by tempering, great wear resistance, toughness, etc.; when working, if high heating of die cannot be avoided, steel containing 9 to 11 per cent tungsten or 0.30 per cent carbon and 15 per cent chromium would be preferred. Translated from Maschinenbau, Oct. 7, 1926, pp. 878–880. See reference to original article in Eng. Index, 1926, p. 708.

Hardening. Hardening by Reheating after Cold Working, M. A. Grossmann and C. C. Snyder. Am. Soc. Steel Treating—Trans., vol. 8, no. 2, Feb. 1928, pp. 201–215 and (discussion) 215–220 and 281, 19 figs. Authors advance theory explaining phenomenon of hardening of cold-worked steel by reheating at low temperatures; evidence points to simple reason for observed changes in strength, hardness and ductility; theory suggested has to do with thin layer of "inter-block" material, which increases gradually in thickness as reheating temperature is raised, reaching maximum effective thickness at 600 deg. fahr.; includes curves and photomicrographs.

High-Speed. See HIGH-SPEED STEEL.

Locomotive Forgings. Steels for Locomotive Forgings, E. J. Edwards. Iron Age, vol. 121, no. 4, Jan. 26, 1928, pp. 255–258, 7 figs. Special care taken by American Locomotive Co. to insure better locomotive forgings; must be sound and clean under fracture and deep-etch test, heated with deliberation, and finally normalized and annealed for highest qualities; sound steel selected at source; well-made acid heat preferable to basic heat; deep-etch test on forging blooms; carbon segregation limited to 15 per cent; heat-treatment practices; testing finished forgings.

Properties. The Mechanical Properties of Steel at High Temperature, H. J. Tapsell and W. J. Clenshaw. Engineering, vol. 124, no. 3233, Dec. 30, 1927, p. 837, 6 figs. Review of Eng. Research Special Report, No. 2, describing work on mechanical properties of materials at high temperatures being carried out at National Physical Laboratory; work was done on .51-per cent carbon steel in rolled bars of 1 in. diam., said to have been normalized before delivery, and .53-per cent carbon cast steel.

Tool. See TOOL STEEL.

STEEL CASTINGS

Stresses. Shrinkage Stresses in Steel Castings (Schwindungsspannungen in Stahlgussstuecken), H. Malzacher. Stahl u. Eisen, vol. 47, no. 50, Dec. 15, 1927, pp. 2108–2112, 4 figs. Internal stresses due to thermal changes and shrinkage; shrinkage stresses due to resistance of mold; examples of such stresses in cast cylinders and transmission pulleys showing compression in thin parts and tension in thick ones.

Welding. When Should Steel Castings Be Welded? R. A. Bull. Foundry, vol. 56, no. 2, Jan. 15, 1928, pp. 48–50, 4 figs. Discussion of art as utilized by steel foundrymen and as capable of use by those who buy steel castings; properties of metal formed during welding operation on casting or other part made of steel; what happens to surface adjoining defect when steel casting is welded; methods for testing welds. Abstracted from Research Group News, Oct. 1927.

STEEL, HEAT TREATMENT OF

Hardening Stresses. Hardening Stresses and Hardening Cracks (Haertespannungen und Haerterisse), L. Traeger. Maschinenbau, vol. 7, no. 1, Jan. 1928, pp. 20–23, 10 figs. Analysis of internal stresses due to heat treatment and metallurgical hardening processes; elastic deformations made permanent by annealing process, which increases resistance of material to external stresses; bearing of these observations on hardening practice.

Progress. Mechanics of Heat Treating are Better Applied to Work. Iron Trade Rev., vol. 82, no. 1, Jan. 5, 1928, pp. 36–37, 2 figs. Opinions of authorities regarding improvements in furnace design and attainment of higher efficiencies; installation of electric furnaces; conditioning of heating chamber atmosphere for maximum oxidation or scaling; improved grain structure in steel castings brought about by heat treatment for greater uniformity and ductility; nitrogenizing promising; knowledge of steels, their manufacture, treatment and behavior augmented considerably by numerous researches.

Quenching. Quenching—A Practical Study of Rapid Cooling, P. J. Haler. Ry. Mech. Engr., vol. 102, no. 2, Feb. 1928, pp. 99–103, 8 figs. Discussion of methods of quenching speed plunging and effect produced on various shapes; common methods of quenching; treats of form as determining factor in methods of quenching and how these forms should be treated; relative values of quenching mediums.

Superhardening. Superhardening of Heat-Treated Steel, E. G. Herbert. Iron Age, vol. 121, no. 5, Feb. 2, 1928, pp. 332–333, 2 figs. Possibility of hard steel articles being superhardened beforehand as means of resisting wear; subjecting articles to impact of cloud of balls, thus producing work-hardened surface; any soft spot revealed by roughened area; successive tests showed progressive increase in hardness up to certain maximum, and thereafter slow softening; method of superhardening by impact; quantity testing for hardness.

STOKERS

Traveling-Grate. Efficiency of Steam Boilers with Traveling Grates (Einfluss der Betriebsweise auf die Wirtschaftlichkeit von Dampfkesseln mit Wanderrostfeuerung), H. Schumacher. Waerme, vol. 50, no. 43, Oct. 31, 1927, pp. 724–727, 1 fig. Traveling grates, used extensively in Germany, are very reliable and durable; by means which are investigated it is possible to obtain relatively high overall efficiencies; tests made in large power station to determine distribution of thermal losses in boiler with steeply inclined water tubes when burning mixed coal having calorific value of 11,000 B.t.u. per lb. See brief English abstract in Eng. & Boiler House Rev., vol. 41, no. 7, Jan. 1928, p. 336.

Experience with Traveling Grates (Betriebserfahrungen mit Wanderrostfeuerungen), F. Gropp. Waerme, vol. 50, no. 44, Nov. 7, 1927, pp. 766–767, 1 fig. Although it has been largely displaced by box-frame type of traveling horizontal grate, original form of chain-grate stoker is, in author's opinion, better type; he is in favor of special cast iron as material for grate bars; flat suspension-type ignition arches are economical and satisfactory in operation; sluggish response of traveling grates to sudden variations in load is often a serious consideration. See brief translated abstract in Power Engr., vol. 23, no. 262, Jan. 1928, p. 33.

T

TEXTILE MILLS

Manufacturing Costs. Reduction of Manufacturing Costs by Labor Extension Methods Based on a Mill Survey, S. S. Paine. Textile Wld., vol. 73, no. 5, Feb. 4, 1928, pp. 152–153. Results have been secured by surveying mills to determine all influences that govern machine or job in order to do away with unnecessary work and needless difficulties; knowledge of variable and careful preparation before change are necessary; examples of actual savings; survey prepares way for changes; information for management; analysis of loom stops; more machines, less work; methods for different products.

Service Equipment. Interesting Structural and Equipment Features at New Plant of Chicopee Mfg. Corp. of Georgia. Textile Wld., vol. 73, no. 5, Feb. 4, 1928, pp. 408–409, 8 figs. Describes features of building construction and building equipment as heating, ventilating, humidifying, lighting; machinery installation is mentioned briefly.

Slater Mills, Marietta, S. C. First Unit of Slater Manufacturing Co.'s New Plant Built at Marietta, S. C. Textile Wld., vol. 73, no. 5, Feb. 4, 1928, pp. 415 and 417, 1 fig. Describes buildings and their equipment; actinic glass used, insulated roofs, lighting system; electric power; equipment includes 10,000 spindles and 720 looms to make rayon-filled alpaca cloth.

THERMODYNAMICS

Entropy. The Concept of Entropy, Limits of Validity of the Second Law of Thermodynamics, R. Plank. Information on Refrigeration (Institut Int. du Froid)—Monthly Bul., no. 9–10, Sept.-Oct. and Oct.-Nov., 1928, pp. 830–835. Points out that second law of thermodynamics is only law that is vectorial, all others being scalar; reversible and irreversible changes may be distinguished essentially by character of physical laws which govern them; application of theorem to steam engine and refrigerating machine. Abstract translated from V.D.I. Zeit., nos. 25 and 27, 1926, pp. 841 and 915. See reference to original article in Eng. Index, 1926, p. 735.

TOOL STEEL

Specifications. Tools and Tool Steel Specifications, E. S. Lawrence. Heat Treating and Forging, vol. 14, no. 1, Jan. 1928, pp. 26–31 and 37, 11 figs. Factors to be considered in specifying for purchase of tool steels; classification, chemical limits, hardening and tempering practice; importance of microscopic examination; presents table giving mechanical limits of carbon tool steels heat-treating features; photomicrographs. Bibliography.

TUBES, STEEL

Heat Treatment. The Effect of Heat Treatment on Cold-Drawn Steel Tubes, F. C. Lea, Engineering, vol. 124, no. 3233, Dec. 30, 1927. pp. 831–834, 9 figs. Load-strain curves under repeated stress; types of failure; effect of pinch and sink on properties of tubes; cold-drawn tubes after final pass have low limit of proportionality, but strength is much higher than that of normalized material.

V

VISCOSIMETERS

Testing. Viscosimeters for Engineering Uses (Untersuchung einiger technischer Zaehigkeitsmesser), S. Erk. Zeit. fuer Technische Physik, vol. 8, no. 12, 1927, pp. 595–599, 5 figs. Report from German government institute for engineering physics on principles of experimental testing of viscosimeters used in engineering practice; description and tests of Engler, Vogel-Ossag, Lawaczeck and Michell viscosimeters.

Uses. Viscosity Measurements and Tests of Viscosimeters (Zaehigkeitsmessungen und Untersuchung von Viskosimetern), S. Erk. V.D.I. Zeit., vol. 72, no. 1, Jan. 7, 1928, pp. 11–14, 5 figs. Report from German State Physico-Technical Institute on application of law of similarity to study of flow phenomena in capillary viscosimeters; description of viscosimeter for standard measurements; comparative tests of Engler, Vogel-Ossag and Lawaczeck viscosimeters.

W

WELDING

Electric. See ELECTRIC WELDING; ELECTRIC WELDING, ARC.

Oxyacetylene. See OXYACETYLENE WELDING.

Pressure Vessels. See PRESSURE VESSELS.

WIND TUNNELS

Tests. Research on Channel Wall Interference, J. H. Parkin. Royal Aeronautical Soc.—Jl., vol. 31, no. 204, Dec. 1927, pp. 1110–1149, 32 figs. Tests at University of Toronto with cylinders and airfoils, using mirror method, for ten channel sizes; theory of airfoil in unlimited and limited stream; wall interference in square and rectangular cross-section channels; two series of tests on cylindrical models; tests on airfoils; log tables and graphs show results of tests; 4 halftones of apparatus. From Aeronautical Research Paper, no. 17 (Canada).

Wind Tunnel Tests on Autorotation and the "Flat Spin," by M. Knight. Nat. Advisory Committee for Aeronautics—Report, no. 273, 1927, 18 pp., 17 figs. Autorotational characteristics of differing wing systems about fixed axis in plane of symmetry and parallel to wind direction; in free flight monoplane incapable of flat spinning; unstaggered biplane has inherent flat-spinning tendencies; difficulty of maintaining equilibrium in stalled flight due primarily to rotary instability, rapid change from stability to instability occurring as angle of maximum lift is exceeded.

WOODWORKING PLANTS

Canada. What Is Said to Be the Most Modern Woodworking Plant in Canada. Elec. News, vol. 37, no. 1, Jan. 1, 1928, pp. 45–49, 12 figs. High output being secured at plant of Hill-Clark-Francis, Ltd., with latest type electric machines; plant completely motorized; planing mill and molding division; electric molder and other equipment; layout of machines in relation to trackage system; hopper and chain conveyors; filing room devices have motors built into them or individual motor drive; lumber-storage building layout; automatic dado-machine operation; C.G.E. motors, starting devices, switches, compensators standard.

THE ENGINEERING INDEX

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AIR COMPRESSORS

Centrifugal, Testing. Centrifugal Air Compressor Testing, R. B. Ingersoll. Sibley Jl. of Eng., vol. 42, no. 2, Feb. 1928, pp. 35 and 66. Tests on centrifugal air compressor at General Electric Co.; machines tested varied from single-stage types of 1 or 2 hp. to those of more than 7000 hp.; single-stage machines driven by electric motors; multi-stage machines direct connected to steam turbine; measurement of input; measuring air pressures about machines; operation of constant-volume governor; distinction between centrifugal compressor and centrifugal blower.

AIR PREHEATERS

Calculation. Calculation of Air Preheaters (Le calcul des réchauffeurs d'air), E. Prat and De Kergaradec. Technique Moderne, vol. 20, no. 3, Feb. 1, 1928, pp. 132–138, 8 figs. Air preheaters with parallel plates; determination of coefficient of transmission, how to increase it; up to what point can surfaces be reduced by raising resistances; cases of slight, moderate and strong recuperation are studied.

AIRPLANE ENGINES

Fairchild-Caminez. The Fairchild Caminez Motor, J. M. Clema. Neb. Blue Print, vol. 27, no. 3, Dec. 1927, pp. 10 and 30, 2 figs. Descriptive article on new cam-drive-type engine, including technical details; specifications, and operating characteristics; 4-cylinder air-cooled engine weighing 340 lb. and developing 142 hp. at 1120 r.p.m.; 4-stroke cycle, compression ratio 5 to 1; cylinders $5^{5}/_{8}$" bore by $4^{1}/_{2}$" stroke; runs 250 hr. without overhaul.

Ford. The Ford Engine. Aviation, vol. 24, no. 9, Feb. 27, 1928, p. 509, 1 fig. Two-cylinder 4-cycle horizontally opposed air-cooled engine developing 36 hp. at 2000 r.p.m.; uses only 3 gal. of gasoline per hour; weighs 118 lb. dry; bore and stroke of $4^{1}/_{4}$ in. when throttled to 1800 r.p.m.; speed of 80 m.p.h.; cylinder head of high-strength aluminum casting; cylinder barrel of steel; pistons of magnesium alloy; crankshaft provided with rear roller bearing and babbitt front main bearing.

Starters. Aircraft-Engine Starters, J. W. Allen. Soc. Automotive Engrs.—Jl., vol. 22, no. 3, Mar. 1928, pp. 387–388. Various forms of equipment for starting aircraft engines and details of their suitability; electrically powered and inertia starters; portable starting equipment; use of electrically operated starters, even with attending battery weight, is felt to be not only convenience but need; cost of starters deters their use.

Starting of Aircraft Engines (Das Ingangsetzen von Flugmotoren), F. Gosslau. V.D.I. Zeit., vol. 72, no. 5, Feb. 4, 1928, pp. 143–147, 15 figs. Describes best-known systems and apparatus classifying them as to mechanical principles; among number of others are mentioned combined electric and hand starter of Eclipse Machine Co., Maybach hand-pump starter, Farman cartridge starter, various compressed-air starters, flywheel starters, one of them of 18,000 r.p.m., electrical flywheel starters, etc.; specifications; weights of starters.

Wright Whirlwind. Wright Whirlwind Engine Operation. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Eeb. 1928, pp. 421–223. Discussion of C. H. Biddlecombe's Aeronautic Meeting paper; experience with Wright Whirlwind engine in 13 months of flying operation over Boston and New York City Air Mail route; 193,000 air-miles; Curtiss Lark, Fokker Universal and Fokker Trimotor fitted with Wright J-4B engine; inspection and maintenance system; commercial aviation turning to larger engines; failures due to lubrication trouble; special fuel and oil not needed; shielding of magnetos.

AIRPLANE PROPELLERS

Variable Pitch (Turnbull). The Turnbull Variable Pitch Propeller. Aviation, vol. 24, no. 8, Feb. 20, 1928, pp. 446–448, 3 figs. Design features of new propeller; blades weigh 15 lb. 3 oz. each; combination of wood, with steel and bronze; carry over of stresses from wooden parts to metal ones very cleverly worked out; small electric motor, mounted forward, and at center of hub, is best means of pilot control; electric indicator on pilot's instrument board showed pilot just what changes of blade angle he was making; brief summary of tests.

AIRPLANES

Airfoils, Slotted. Results of Aerodynamic Tests on Slotted Airfoils in the Aerotechnical Laboratory (S. T. Ae.) of Rhone St. Genese, Brussels, P. Puvrez. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 449, Feb. 1928, 19 pp., 6 figs. Investigation of maximum lift obtainable with slotted airfoils derived from symmetrical airfoil; center of lift travels contrary to usual direction as angle of attack is increased; tests of series of slotted airfoils derived from dissymmetrical airfoil. Translated from Service Technique de L'Aérotechnique Belge—Bul., nos. 1 and 4, Apr. and July, 1927.

Autogiro. Progress of the Autogiro, J. de La Cierva. Flight, vol. 20, no. 7, Feb. 16, 1928, pp. 102–103. Elementary features of latest type of Autogiro; ailerons replaced by small pair of monoplane wings in order to save unnecessary drag; owing to slow landing speed undercarriage is very wide; extra revolution counter connected to revolving wings; bumps hardly felt, and in worst weather it was not necessary to use controls; machine answered with extraordinary obedience to rudder, ailerons and elevator. Abstract of paper presented at Cambridge Univ. Aeronautical Soc.

Automatic Slot (Handley-Page). The Handley-Page Automatic Slot, O. H. Lunde. Aviation, vol. 24, no. 9, Feb. 27, 1928, pp. 506–508, 11 figs. Handley-Page slot described; maintains continuity of flow over upper surface of airfoil at angles considerably above burble point, or angle of maximum lift; diagrams of pressure distribution; when plane has reached stalling attitude, slot automatically opens and gives to wing enough increase in lift to maintain steady controlled flight, thus avoiding possibility of plane falling off into spin.

Resistance. Calculation of the Resistance to Forward Motion of an Airplane Fuselage Having a Front Radiator (Calcul de la résistance à l'avancement d'un fuselage d'avion muni d'un radiateur frontal), Toussaint. Aérophile (Paris), vol. 36, nos. 3–4, Feb. 1–15, 1928, pp. 50–54, 6 figs. Calculations made from tests conducted in aerodynamic laboratories; influence of truncation of front of fuselage; influence of air discharge through radiator.

Single vs. Multi-Engine. Single-Engine Versus Multi-Engine Airplane, A. H. G. Fokker. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 190–192 and (discussion) 192–194. Multi-engine airplanes divided into those which can and those which cannot fly with full normal load after one or more engines have stopped; ability to fly with one engine necessitates sacrifice in pay load; insurance against forced landings gained only at cost of increased fuel consumption and greater head resistance; propeller speed less with dead engine; turning forces on plane present problem; single-engine plane has longer range.

Welding Work on. Welding in Airplane Construction, A. Rechtlich and M. Schrenk.

Note.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 453, Feb. 1928, 28 pp., 2 figs. Principles for production of perfect weld; possibilities of testing strength and reliability of welded parts; most important and dangerous stresses for welded structures are alternating or oscillating stresses; production of perfect welded joint depends on suitability of structure for welding, use of suitable material and welding wire and on knowledge and conscientiousness of welder. Translated from Schweissen im Flugzeugbau.

Wind-Tunnel Tests. Wind-Tunnel Tests of DH-4B Model Fitted with Various Fins and Rudders. Air Corps Information Circular, vol. 7, no. 603, Nov. 1, 1927, 11 pp., 17 figs. Tests to determine change in slipstream effects and rudder control due to variations in shape and vertical location of rudder and fin; vertical tail surfaces tested on DH-4B model; results given by graphs of coefficients; high-aspect-ratio gives best rudder control at expense of somewhat greater rudder angle.

Wing-Beam Design. The Design of Airplane Wing-Beams, J. S. Newell. Am. Soc. Civil Engrs.—Proc., vol. 54, no. 3, part 1, Mar. 1928, pp. 725–787, 22 figs. Presents method developed by U. S. Army Air Corps for analysis and design of beams used in airplane wings; parts I and II completely cover analysis and designs of wooden beams subjected to combined loadings; part III presents and discusses results of several tests made on pin-ended struts at McCook Field, Dayton, Ohio.

Wing-Pressure Distribution. Pressure Distribution on Wing Ribs of the VE-7 and TS Airplanes in Flight, R. V. Rhode. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 277, Jan. 1928, 61 pp., 57 figs. Complete results of pressure-distribution tests made at Langley Field on wing and tail ribs for particular maneuver of flight; curves show variation of pressure distribution, total loads, normal acceleration and center of pressure with respect to time.

ALIGNMENT CHARTS

Standardization. Proposed Standardization of Construction of Nomographic Charts (Vorschlaege zur Vereinheitlichnung der Ausfuehrung nomographischer Rechentafeln), G. Oberdorfer. Zeit des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 80, nos. 3–4, Jan. 20, 1928, pp. 19–21, 12 figs. General discussion of principles of nomographic representation; types of nomograms and proposed nomenclature of nomographic elements; proposed standard forms for nomograms.

AUTOMOBILE ENGINES

Connecting Rods, Manufacture. Connecting-Rod Methods in the Lancia Plant, J. A. Lucas. Am. Mach., vol. 68, nos. 9 and 10, Mar. 1 and 8, 1928, pp. 381–385, 11 figs., and 407–411, 12 figs. Mar. 1: Details of fixtures and machines used at Lancia plant for manufacturing connecting rods; forging and heat treatment; milling two reference surfaces for future operations; surfaces for caps ground on Pratt & Whitney machine; in fixture that holds connecting rod ball or swiveling button adjusts itself to any irregularity in rod forging. Mar. 8: Connecting-rod machining operations; boring and grinding bearings; milling, broaching and reaming operations; gages for inspecting bearings for parallelism and rod for twist; milling oil groove across wristpin end of rod; method of weighing in securing desired balance.

Cylinders, Machining. Cylinder-Head Operations, J. A. Lucas. Am. Mach., vol. 68, no. 7, Feb. 16, 1928, pp. 285–287, 6 figs. Machining problems involved in cutting oblong combustion chamber; cylinder head contains only cast iron; planing of both faces in lots of eight; combustion chambers machined on heavy-duty Colburn machines; drilling and reaming holes for valve-stem bushings; cylinder heads given water test of about 90 lb. pressure.

Lancia Methods of Machining Aluminum Cylinder Blocks, J. A. Lucas. Am. Mach., vol. 68, no. 6, Feb. 9, 1928, pp. 247–252, 9 figs. Methods used in machining combination aluminum cylinder blocks and cast-iron cylinders; grinding on Brown & Sharpe machine; on cylinders bored by horizontal method, two rough and one finish grinding operations necessary; cylinders bored on vertical machine, finish ground in one operation; diagrams showing major operations; checking center distance for spiral-gear shafts of vertical control; alignment of transmission supports.

Fuel Consumption. Relation of Fuel Consumption to Engine Compression in Cars, G. G. Brown. Oil and Gas Jl., vol. 26, no. 40, Feb. 23, 1928, pp. 196, 198 and 200. Brings out relative advantages and disadvantages inherent in different methods of increasing engine displacement in motor cars; both of these methods of increasing car performance invariably increase fuel consumption.

High-Compression. Ricardo Discusses High Compression Engines, H. R. Ricardo. Automotive Industries, vol. 58, no. 6, Feb. 11, 1928, p. 200. Mean temperature during firing stroke lowered very considerably owing to longer expansion; compression ratios most suitable were fuel obtainable which would not produce detonation under any conditions; combustion-chamber design from standpoint of detonation; experiments made with sleeve-valve engines. Abstract of paper read before Brit. Instn. of Petroleum Technologists.

Vibration Reduction. Isolating Engine Vibration. Autocar, vol. 60, no. 1683, Feb. 3, 1928, pp. 203–204, 14 figs. Discussion of methods of various manufacturers to reduce engine vibration; causes of trouble; flexible mountings used by Alvis Co. and 14-hp. Hillman car; on each side of Rolls-Royce engine damper of frictional shock-absorber type absorbing reaction from torsional vibration in crankshaft; engine mounting of 6-cylinder Rover car; laminated spring of transverse type used on four-cylinder Chrysler engine; 14-hp. Humber system.

AUTOMOBILES

Design Trends. Current Trends in Passenger Car Design. Automotive Industries, vol. 58, no. 7, Feb. 18, 1928, pp. 244–245, 15 figs. Charts showing trend in design compared with that of other years; maximum horsepower; compression ratios; oil cleaners; minimum turning circle; division of 4-wheel brakes; air cleaners; steering gears; front-end drives; clutch types; makes and models; valve location; number of crank-shaft bearings; piston material; number of cylinders; type of axle.

Shock Absorbers. Shock-Absorber Characteristics, N. F. Hadley. Soc. Automotive Engrs.—Jl., vol. 22, no. 3, Mar. 1928, pp. 356–362, 7 figs. Requirements of satisfactory shock absorber; one-way type; advantage of decreasing resistance on rebound; constant-control type; one-way hydraulic type; trend toward two-way devices; hydraulic two-way shock absorbers; characteristic that gives riding comfort; rotary and reciprocating types; possibilities of mechanical friction type; cam-actuated type most promising.

Six-Wheel. Motor Vehicles with Six Wheels (Les vehicules automobiles industriels á six roues), C. Martinot-Lagarde. Technique Moderne, vol. 20, no. 4, Feb. 15, 1928, pp. 163–168, 15 figs. French 6-wheel chassis; English types, gasoline, steam, and electric driven; discusses action of wheels meeting obstructions on rough roads.

Transmissions. Internal Gears Used in Detroit 3- and 4-Speed Gearsets, A. F. Denham. Automotive Industries, vol. 58, no. 6, Feb. 11, 1928, pp. 196–197, 3 figs. Adoption of internal gear reductions for next-to-high speed in two types of transmission manufactured by Detroit Gear & Machine Co.; both units offered for original equipment; spur and internal gear reductions located in different compartments of transmission case to facilitate lubrication.

B

BALANCING MACHINES

Dynamic-Static. New Dynamic-Static Balancing Machines, F. Hort. Am. Soc. Naval Engrs.—Jl., vol. 40, no. 1, Feb. 1928, pp. 123–129, 6 figs. New balancing process lately developed consisting of combined dynamic-static method of balancing used in balancing machines built by Krupp in Essen, Germany; gives fundamentals of new method of balancing and apparatus used. Translated from Kruppsche Monatshefte, Oct. 1927.

BOILER FURNACES

High-Capacity. Some Factors in Furnace Design for High Capacity, E. G. Bailey. Universal Engr., vol. 47, no. 2, Feb. 1928, pp. 28–32. Reports progress in furnace designs for high capacities; principal factors that should control furnace designs; stoker furnaces; ash removal; rates of heat transfer.

Pulverized-Coal. Boiler Tests with Unit Mills at Cahokia, E. H. Tenney. Power Plant Eng., vol. 32, no. 4, Feb. 15, 1928, pp. 238–239, 2 figs. Three months' continuous operation of new boiler unit has proved entirely satisfactory; each boiler is fired by 2 Simplex-unit pulverizers with capacity of 15,000 lb. per hr. each, using 4-in. white-iron paddles; boiler fired with turbulent burners.

BOILERS

Circulators. The "Brundrit" Automatic Boiler Circulator. Iron and Coal Trades Rev. (Lond.), vol. 116, no. 3129, Feb. 17, 1928, p. 232, 1 fig. Unlike majority of boiler circulators which put water into circulation from hottest part of boiler, immediately above flues, Brundrit apparatus puts coldest of water into circulation, that from bottom of boiler; it is made to function solely by difference in temperature, which must always obtain between water in top and bottom of boiler, respectively.

Control. The Hagan Control System, H. E. O'Breen. Eng. and Boiler House Rev., vol. 41, no. 8, Feb. 1928, pp. 380 and 382–384, 5 figs. Outlines what automatic installation consists of; particulars of one of many plants where Hagan system has been installed; with Hagan regulators quick and accurate adjustments are made, and improved efficiency has resulted in saving of 608 tons of coal per year, equal to nearly 4 per cent of former fuel consumption.

Heads, Design of. Design of Unstayed Dished Boiler Heads for Internal Pressures (Die Berechnung ankerleser gewoelbter Boeden auf Innendruck), E. Hoehn. Archiv. fuer Waermewirtschaft (Berlin), vol. 9, no. 2, Feb. 1928, pp. 49–53, 21 figs. Geometry of basket and elliptical arches; stresses and strains in outward face of basket and elliptical dished heads; maximum tensile stresses; computation of plate thickness.

Heat Transmission in. Heat Transmission in Modern Boilers; Boilers with Large Radiation and Convection Surface (Processes de la transmission de la chaleur dans les chaudières modernes; chaudières à grand rayonnement; chaudières à grande convection), Roszak and Veron. Société des Ingénieurs Civils de France—Proces-Verval (Paris), no. 3, Feb. 24, 1928, pp. 93–98. Shows how heat-transfer laws explain and coordinate phenomena observed and justify success of certain devices which have been developed in steam boilers.

High-Pressure. Some Experiences with the High-Pressure Boilers at Edgar Station (Boston). Power, vol. 67, no. 11, Mar. 13, 1928, pp. 459–461, 5 figs. Account of experiences with two boilers comprising second high-pressure unit; each designed to generate 270,000 lb. of steam per hour and fired by 16-retort 45-tuyère underfeed stoker; troubles encountered to date have consisted chiefly of water-wall tube failures, superheater burnouts, and some difficulty in operating stokers with highly preheated air.

Locomotive. See LOCOMOTIVE BOILERS.

Piedboeuf. New Boiler Plant of the Stockholm Electric Works (Ny angpanneanlaggning vid centralstationen i Stockholm), C. G. Dahlby. Teknisk Tidskrift (Stockholm), vol. 58, no. 7, Feb. 18, 1928, (Mekanik) pp. 16–1 , 4 figs. Details of Piedboeuf boilers with ordinary water tanks and separate steam chambers, with steam pipes laid underground.

Regulators. Automatic Boiler Regulators in Power Plants (Selbsttaetige Kesselregler in Elektrizitaetswerken), J. Hak. Elektrotechnische Zeit., vol. 49, no. 4, Jan. 26, 1928, pp. 129–133, 11 figs. Function and merits of automatic boiler regulators, principles of their design and operation, details of Smoot and Roucka regulating devices; descriptions of American and European plant installations.

Water-Tube (Sulzer). The Sulzer Vertical Water-tube Boiler and New Boiler-shops. Mech. World (Manchester), vol. 83, no. 2146, Feb. 17, 1928, pp. 116–117, 2 figs. Design has several interesting advantages; it requires no stay rods, has no flat sides or ends, and tubes are vertical. Sulzer Brothers have recently erected and put into operation some new boiler shops.

C

CARS

Freight. A 65-Ft. Car for Steel Loading. Ry. Age, vol. 84, no. 10, Mar. 10, 1928, pp. 585–586, 2 figs. Use of longer cars should result in operating economies; greatest saving to steel shippers will be found in elimination of expense of blocking double load.

Refrigerator. An Iceless Refrigerator Car. Ry. Age, vol. 84, no. 7, Feb. 18, 1928, pp. 406–408, 5 figs. Used for transporting fish from New London, Conn., to Fort Worth, Tex. maintaining uniform load temperature of about 15 deg. fahr.; principle of operation is based on certain physical properties of silica gel; silica gel, its composition and properties; operation of refrigerating apparatus; thermostat control;

tests have shown that temperature variation throughout length of car is not more than two or three degrees.

CASE-HARDENING

Diffusion. The Diffusion of Carbon in Carburized Iron. Fuels and Furnaces, vol. 6, no. 2, Feb. 1928, pp. 211–212, 6 figs. Investigation by E. Zingg; microscopic examination showed exclusively that with steel samples within temperature range of 1200 to 1470 deg. fahr., surface zones had been transformed into cementite layer; results show that true diffusion takes place only up to content of saturated mixed crystals, while with reaction diffusion, content of highest chemical composition may be attained. Translated from Stahl u. Eisen.

CAST IRON

Centrifugally Cast. Spun-Sorbitic Cast Iron. Automobile Engr., vol. 18, no. 238, Feb. 1928, p. 59, 3 figs. New process for producing cylinder barrels by centrifugal casting; experimental work to determine conditions necessary for successful casting; improvement in resistance to wear; subjecting cylinder castings to special cooling treatment while in mold during rotation.

Semi-Steel. The Manufacture of Steel-Mix Grey-Cast Irons, with Special Reference to Their Treatment in the Foundry, A. Smith. Foundry Trade Jl., vol. 38, no. 598, Feb. 2, 1928, pp. 77–79, 2 figs. By adoption of suitable mixtures and correct melting technique, it is possible to make with perfect regularity 30 to 60 per cent steel-mix gray cast irons, which will be almost entirely pearlitic in structure, readily machinable and yet possess vastly superior properties to gray cast irons made from pig irons alone or pig irons mixed with cast-iron scrap; classification of semi-steel cast iron; graphite in semi-steel cast iron; cupola design.

COAL HANDLING

Railway Terminals. Coal Terminal Renders Unusual Service. Ry. Age, vol. 84, no. 7, Feb. 18, 1928, pp. 399–402, 3 figs. Complex business of supplying New York City with coal is much facilitated by Reading; describes terminal built principally to handle traffic of fuel jobbers of New York and vicinity; fuel moved through Port Reading terminal during 1926; facilities at Port Reading; yard operations; boat-transfer operations; cars are clamped in place at cradle, elevated and turned over, coal running through pan conveyor and movable chute into barges; total of 336 cars has been unloaded by this dumper in 10 hours; lighterage system.

CONVEYORS

Automobile Plant. How Nash Uses Conveyors in the Cylinder Shop. Am. Mach., vol. 68, no. 7, Feb. 16, 1928, pp. 279–282, 6 figs. Layout arranged to reduce manual handling to a minimum; building arranged so that cylinders are started at one end in rough condition and travel in straight path to opposite end, where final inspection is made; foundry building connected to cylinder department by underground conveyor; drilling and tapping miscellaneous holes.

Belt. Handling Mill Refuse on 1600 Ft. Belt Conveyor Line, W. A. Scott. Power Transmission, vol. 32, no. 1, Jan. 1928, pp. 130–131, 2 figs. Pulverized refuse from saw mills of Long-Bell Lumber Co. carried from saw mills by belt-conveyor line; conveyor operated in four connected sections, made up of four 48-in., seven-ply, rubber-covered, endless belts; conveyor arrangement; power house; fuel-house supply continuously replenished by two sets of belt conveyors; barge loading.

Textile Mills. Conveyors Save Labor, Increase Production, Reduce Wear and Lower Compensation Insurance, J. H. Hough. Textile World, vol. 73, no. 9, Mar. 1928, pp. 60–61 and 83, 20 figs. Descriptions of installations made in various departments of textile plants; bales of cotton or wool; yarn manufacturing; weave room; benefits derived.

COPPER CASTINGS

Bulky. Presents Notes on Making Bulky Copper Castings, W. J. Clark. Foundry, vol. 56, no. 5, Mar. 1, 1928, pp. 181–184, 6 figs. Method of pouring heavy copper castings; reasons why copper is difficult metal to cast; impurities resulting from atmospheric contact; charcoal in runner box forms protective covering throughout pouring; manner of gating casting for its running; correct pouring rate; difficulty of adequately feeding against shrinkage; tenure of fluidity over that of casting depends on form, volume, and temperature.

COST ACCOUNTING

Daily System. Daily Cost System Affords Close Check on Operating Expense, R. C. Myers. Iron Trade Rev., vol. 82, no. 9, Mar. 1, 1928, pp. 560–562 and 565, 4 figs. Daily cost system employed successfully in two establishments; cost information must be available to executive officers promptly and at frequent intervals; control based on monthly figures too often involves abrupt changes in routine which not only affect morale in plant but result in doubtful economy; assembling of "Cost Above Metals" figures.

COSTS

Standard, Setting. Basic Data for Setting Standard Costs, H. J. Bock. Mfg. Industries, vol. 15, no. 2, Feb. 1928, pp. 115–118, 1 fig. Shows how to symbolize parts, subassemblies, assemblies and operations; it is claimed that even in relatively small plant many hours of clerical work and dollars of expense can be saved by methods described.

CRANES

Foundry. Foundry Jib Crane of Great Flexibility. Iron Age, vol. 121, no. 8, p. 530, 1 fig. Design fitted for work in limited space; unusual ball-bearing arrangement; electric welding employed in attaching crane supports; handling molds mechanically in limited space is problem which has been solved by Fox Furnace Co., Elyria, Ohio, by erection of specially designed jib crane which takes place formerly occupied by wooden building column; crane swings complete circle, covering one-half of two bays.

Track. A Track Crane with New Features. Ry. Eng. and Maintenance, vol. 24, no. 2, Feb. 1928, pp. 76–77, 1 fig. Crane is mounted on flat car between other cars and loads or unloads two cars before switching, thus reducing switching to one-half of what would be required if crane could work from end of car only; power is supplied by 40-hp., 4-cylinder gasoline engine and car has two speeds in each direction; crane has capacity of 5000 lb. with hoisting speeds of 90 ft. and 180 ft. per min.

CUPOLAS

Charging. Cutting Costs and Avoiding Accidents, G. F. Tegan. Iron Age, vol. 121, no. 7, Feb. 16, 1928, pp. 461–462, 3 figs. Mechanical charging system for cupola saves 66 per cent in operating charges; injury hazard reduced; system in foundry of Union Switch & Signal Co.; storage bins built into instead of above ground; besides mechanical charging only one handling of raw materials; nine storage bins; scale car with automatic measuring devices.

CUTTING TOOLS

Diamond. Diamond Cutting Tools. Machy. (Lond.), vol. 31, no. 799, Feb. 2, 1928, pp. 577–578, 7 figs. Application of diamond cutting tools to finish turning of aluminum-alloy pistons and boring of white-metal liners for crankshaft and connecting-rod bearings; advantage in finish and accurate sizing; eliminates hand scraping or bedding bearings; feed should be about 0.001 in. per revolution of tool; design of tools for machining alloy pistons; diamond boring tools.

Welded Tips. Economic Production and Maintenance of Welded-on Cutting Tips (Untersuchung ueber die wirtschaftliche Herstellung und Instandhaltung aufgeschweisster Schneidmetalle), Kreide. Maschinenbau, vol. 7, no. 2, Jan. 19, 1928, pp. 55–56, 2 figs. Economy of welded-on high-speed steel tips, cost of production; curves giving diameters of cutting tools of homogeneous materials equal in cost to cutting tools with welded tips.

CYLINDERS

Hollow Steel, Quenching Stresses. Heat Stresses in Connection with Cooling or Refining of Large Hollow Cylinders (Waermespannungen beim Abkuehlen bzw. Vergueten grosser, hohlgebohrter Zylindern), E. Maurer. Stahl u. Eisen, vol. 48, no. 8, Feb. 23, 1928, pp. 225–228, 4 figs. Determination of temperature curves in quenching of hollow cylinders; exponential equation of heat conduction, and its solution; integral equation of tangential stress developed by Lorenz, and its solution; cylinder of chromium-nickel steel was used for investigation, and it was shown why hollow drilling greatly reduces stresses due to quenching.

D

DIES

Bending. Examples of V-die Bending. Machy. (Lond.), vol. 31, no. 800, Feb. 9, 1928, pp. 606–607, 1 fig. Examples of various types of bends that may be made in V-die; construction of die and punch used is such that it will permit large variety of right-angle bends to be made on angular strips of sheet metal; gage generally used for locating work on die; bending operations.

Brass-Forging. Characteristics of Brass-Forging Dies, F. W. Curtis. Am. Mach., vol. 68, no. 8, Feb. 23, 1928, pp. 319–322, 10 figs. Construction of dies and several representative examples of their use; have greater accuracy, additional strength and better machining qualities than casting; made similar to steel forging but with many precautions; standard practice at Mueller Brass Co.; dies of power-press type; dies of drop-hammer type.

DIESEL ENGINES

Design. American and German Diesel Engines Described. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 154 and 266–267. Review of Diesel Engine Session; brief abstracts of papers covering Diesel design and construction and aluminum-alloy pistons in wide size range; Diesel Engine Performance Compared, by Dr. W. Riehm; automobile Diesel engines; Horning sees no small Diesels; for aircraft, Diesel engine promises improvement in regard to fire hazard and cruising range; rail-car Diesel engine of 200 hp.; economy of Diesel-engine locomotives.

High-Speed. High-Speed Diesel Engines, O. D. Treiber. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 183–189, 7 figs. Study to determine efficiencies and mean effective pressures when Otto and Diesel cycles are combined in varying percentages; improvement in thermal efficiency up to 30 per cent of fuel burned at constant volume; new metal alloys and weight reduction; high pressures necessitate heavy construction; time-lag serious barrier; possibilities of direct injection.

Improvements. Bringing Larger Powers into the Diesel-Electric Field, H. Becker. Oil Engine Power, vol. 6, no. 2, Feb. 1928, pp. 103–106, 5 figs. Improvements in double-acting Diesels increase speed and reduce weight; recent developments by M.A.N. Co.; increasing speed of engines and reducing weight of both engine and generator materially decreases production cost; adaptation of solid injection to high-speed double-acting Diesel; marine applications; marine types designed for air injection and stationary units for solid injection; details of high-speed type; change in cylinder-block design; cylinder heads in two parts; fuel valves; piston-cooling system.

Thermal Efficiency. Diesel Engine Thermal Efficiency and M.E.P., B. M. Thornton. Power Plant Eng., vol. 32, no. 5, Mar. 1, 1928, pp. 296–297, 1 fig. Method of quickly determining thermal efficiency of Diesel engine from its card, based upon newly derived formula and chart.

E

ELECTRIC FURNACES

Heat-Treating. Rotary Hearth Furnace Automatically Discharges Parts into Quench Tank. Fuels and Furnaces, vol. 6, no. 2, Feb. 1928, pp. 197–200, 3 figs. Electrically heated furnace with rotary hearth and automatic dumping mechanism, placed in operation in heat-treating department of The Nash Motors Co., Racine, Wis., is used in heat treatment of various types of automobile parts such as steering knuckles, gear blanks, piston pins, etc.

High-Frequency. The New Ajax-Northrop Electric Furnace at the Edgar Allen Works, Sheffield. Brit. Machine Tool Eng., vol. 5, no. 49, Jan.-Feb. 1928, pp. 15–16, 2 figs. Steel itself is contained in crucible or pot somewhat similar to those used in past; this is surrounded by about inch of heat-insulating sand; around this electric coil is wound carrying high-frequency alternating current; 450 lb. of metal take 45 minutes approximately to melt.

ELECTRIC LOCOMOTIVES

Design. Recent Electric Locomotive Designs, J. D. Alrich. Sibley Jl. of Eng., vol. 42, no. 2, Feb. 1928, pp. 36–38 and 58, 60, and 62, 3 figs. Brief résumé of different types of electric locomotives; low-voltage d.c., high-voltage d.c., and single-phase a.c. locomotives; principal data on New York Central passenger locomotives, operating from third rail at 600 volts; passenger and freight locomotives built for Great Northern Railway operate at 11,000 volts, 25 cycles a.c.; three passenger locomotives just shipped to Brazil for use on Paulista Railway operate at 3000 volts d.c.

Switzerland. New Electric Freight Locomotives (Nouvelles locomotives électriques à marchandises). Génie Civil, vol. 92, no. 6,

Feb. 11, 1928, pp. 129–132, 4 figs. Describes new electric freight locomotives built by Oerlikon for Swiss federal railways; can haul 1400 tons at 65 km. per hr. on level; composed of central cab and two hoods at each end which contain motors; total length 20 m.

Tri-Voltage. Tri-Voltage Locomotives, W. R. Taliaferro. Elec. Traction, vol. 24, no. 2, Feb. 1928, pp. 80–81, 1 fig. New electric locomotives built for Sacramento-Northern Railway operating on three different voltages and power collected from third-rail trolley; changeover arrangement between trolley and third rail; auxiliary apparatus; mechanical parts; locomotives operate at maximum speed of 35 mi. per hr., and have maximum tractive effort of 45,300 lb. at 33$^1/_3$ per cent adhesion.

ELECTRIC WELDING, ARC

Atomic-Hydrogen. Atomic Hydrogen Arc Welding, J. D. Wright. Iron and Steel Engr., vol. 5, no. 2, Feb. 1928, p. 100. Description of atomic-hydrogen method of arc welding; alternating current maintained between adjustable tungsten-wire electrodes, and hydrogen gas fed to arc around electrodes; equipment required; designed to operate from single phase, 60 cycles; welding of alloy steels and thin metals; test data.

Machines. Arc Welding for Machinery, A. F. Davis. Elec. World, vol. 91, no. 10, Mar. 10, 1928, pp. 513–515, 5 figs. Analysis of underlying factors governing use of arc welding, with some examples of cost comparison with cast iron; in so far as welding may be used to fabricate jobs which were formerly made using castings or riveted steel, and produce equivalent job at less cost, welding will be used.

Non-Ferrous Metals. Arc-Welding of Non-Ferrous Metals, A. Churchward. Can. Machy., vol. 39, no. 4, Feb. 23, 1928, pp. 36–37. Non-ferrous electrodes, nickel, brass, bronze, aluminum and monel do not act in same way that ferrous electrodes do; ability of electrode to do overhead or vertical welding depends on globular formation of electrode material when passing through arc; to successfully weld copper and bronze, heat of parent metal must be kept up to point at which molten globule from electrode will fuse in; as each length of electrode is fused down, hammer weld and brush same thoroughly before more molten metal is applied.

F

FACTORIES

Buildings, Remodeling. Remodeling Old Manufacturing Buildings to Cut Operating Costs, T. S. Rogers. Mfg. Industries, vol. 15, no. 2, Feb. 1928, pp. 135–138, 4 figs. Points out that operating charges can be lowered and production costs cut either by remodeling present structures or by buying well-built but unused factory at bargain price.

FILES

Rasps and, Circular. The Manufacture of Circular Files and Rasps (Die Herstellung von Feil- und Raspenscheiben), H. Reininger. Maschinenbau, vol. 7, no. 3, Feb. 2, 1928, pp. 112–116, 14 figs. Uses of raps and file disks, rotating with speed of 200 to 1500 r.p.m., in working of copper and light-metal alloys; materials of construction, their treatment, cementation and nitride case-hardening, annealing, shaping of filing surface and final hardening; macroscopic and microscopic studies of structure; used-up filing surface can be renewed 8 to 12 times.

FLOW OF GASES

Measurement. Thermal Volume Meter, G. W. Penney and C. J. Fechheimer. Am. Inst. Elec. Engrs.—Jl., vol. 47, no. 3, Mar. 1928, pp. 181–184, 6 figs. Originally brought out by Prof. Thomas; temperature of gas is raised by means of electric heater, change in temperature being accurately measured either by means of resistance thermometers connected in Wheatstone bridge network, or by means of thermopile; possible sources of error in meter; notes on design, including means of calculating proportions of heater; advantages and disadvantages of various methods of measuring gas volumes; comparison of resistance thermometers and thermocouples for temperature measurement.

FOUNDRIES

Refractory Materials for. The Selection and Use of Refractories for Iron Foundries, C. Presswood. Foundry Trade Jl., vol. 38, no. 596, Jan. 19, 1928, pp. 43–47 and (discussion) 47, 3 figs. Desirable properties which refractory materials may be called upon to withstand are: intense heat, chemical action of fluxes, physical and mechanical conditions, changes of temperature, oxidizing and reducing atmospheres and rough handling before use; presents curve showing behavior of refractory material under increasing temperature conditions.

G

GAGES

Westinghouse Plant. Inspection Devices in the Westinghouse Plant, W. H. Miller. Machy. (N. Y.), vol. 34, no. 7, Mar. 1928, pp. 501–503, 8 figs. More examples of 8000 special inspection devices required in building electrical machinery and equipment at plant of Westinghouse Elec. & Mfg. Co.; two adjustable beam-type gages; spherical and depth gages for bearings; testing device for extension springs; fixture for checking various drilling, boring and milling operations; checking squareness of commutator bars; device for checking flat springs.

GAS ENGINES

Crankless. The Michell Crankless Engine, G. U. L. Sartoris and K. Watson. North-East Coast Instn. Engrs. and Shipbldrs.—Advance Paper for mtg. Feb. 24, 1928, 28 pp., 14 figs. Description of crankless mechanism suitable for high-speed engines; applicable to any type of reciprocating engine, whether prime mover, pump, or compressor; 280-hp. gas engine is described, and test performances are given; possible applications for marine main or auxiliary engine drive; comparison of these with existing direct-drive Diesel engines.

GEARS

Tooth Measurements. Measurement of the Thickness of Involute Gear Teeth, A. H. Candee. Am. Mach., vol. 68, no. 9, Mar. 1, 1928, pp. 365–368, 3 figs. Formulas for pin measurement of gear-tooth thickness developed; measuring distance across round pins or plugs placed between teeth on opposite sides of gear to determine tooth thickness; tables from which dimension across pins for standard involute spur gears can be obtained very easily; direct methods of calculation given for special cases of spur gears and for helical gears.

GRINDING

Cylindrical. Recent Practice in Cylindrical Grinding. Automobile Engr., vol. 18, no. 238, Feb. 1928, pp. 56–59, 9 figs. Examples of modern equipment for reducing cost; application of self-contained motor drive; grinding operations on boring bar 48 in. long; plunge-cut grinding; saddle-type grinder fitted with wide wheel or plunge-cut wheel head for grinding tapered end of axle shaft.

Surface. Precision Surface Grinding, E. C. Larke and F. C. Smith. Machy. (Lond.), vol. 31, no. 799, Feb. 2, 1928, pp. 579–581, 6 figs. Design of drill jig for accurate work; end face tested for parallelism with machined slot; grinding columns; obtaining accurate relative planes; figured vice jaws to enable compound gap to be milled in square component, shaped vees functioning as gripping units; grinding compound gaps.

H

HARDNESS TESTS

Brinell. Does Hardness Govern? E. Bremer. Foundry, vol. 56, no. 3, Feb. 1, 1928, pp. 106–108. Points out that correlating of Brinell hardness with other hardness qualities is complicated; it is believed that definite steps should be taken to investigate various relationships and establish Brinell hardness test as indicator of certain qualities on standard basis; need for this is exemplified in number of replies received in answer to letters requesting information on value of Brinell test.

Hardness Testing Machine. An Improved Hardness Tester. Iron Age, vol. 121, no. 9, Mar. 1, 1928, pp. 602–603, 4 figs. Accurate and proportional Brinell numerals claimed for British machine developed by Vickers, Ltd.; diamond pyramid indenter pressed into work under low load and at automatically controlled rate; machine is superior for metals of great hardness, and is applicable to finished work and very thin sheets; specially designed micrometer ocular provided; details of operating machine.

HEAT INDICATORS

British Thermal Unit. The New Improved Type of Brady B.T.U. Indicator, R. A. Malony. Instruments, vol. 1, no. 2, Feb. 1928, pp. 105–109, 4 figs. Portable instrument for indicating heating value of gases directly in B.t.u. per cubic foot; readings are independent of room temperature, humidity of atmosphere and barometric pressure; operation of indicator; accurate seamless drawn brass tube with gage glass mounted on side; air and gas inlet cocks combined with mixing cock; calibration.

HEATING

Radiant. Radiant Heating, A. H. Barker. Elec. Rev., vol. 102, no. 2619, Feb. 3, 1928, pp. 211–212, and (discussion) 212–213. General survey of heating problem, and description of some of more modern methods of radiant heating; radiant methods of heating divided into two classes, high-temperature, or incandescent, methods, and low-temperature, or distribution, methods; discusses various methods evolved for application of this form of heating, particularly use of metal panels on walls and ceilings, which, in addition to being heated by means of hot-water pipes, lend themselves to use with gas or electricity as heating medium and would probably become very general. Paper read before Royal Soc. of Arts.

HIGH-SPEED STEEL

Quenching. What Happens When High Speed Steel Is Quenched, B. H. De Long and F. R. Palmer. Am. Soc. Steel Treating—Trans., vol. 13, no. 3, Mar. 1928, pp. 420–430 and (discussion) 430–434, 11 figs. Deals with metallography of high-speed steel when tempered at 1100 deg. fahr. after cooling during quenching to varying temperatures below 1300 deg.; high-speed tools tempered (drawn) before being allowed to become sufficiently cold in quench are brittle due to mixed structures; straightening of high-speed tools may be readily carried out during quenching at between 1300 and 700 deg.

HYDRAULIC TURBINES

High-Head. Western Conditions Responsible for Development of High Head Reaction Turbines, E. M. Breed. Hydraulic Eng., vol. 4, no. 2, Feb. 1928, pp. 74–76, 82 and 110–111, 8 figs. Unusual problems of design encountered when first high-head reaction turbines were considered for development; required very definite departure from accepted low-head turbine design; efficiency curve of high-head, low-specific speed reaction turbine; this type of unit permits very high efficiencies over wide range of load capacities; describes latest-type turbine installed in Portland Elec. Power Co., Oak Grove plant, Calif.

Lawaczeck. The Hydraulic Turbines of the Lilla Edet Power Station on Gota River (Turbinanleggene ved Lilla Edet kraftanlegg i Gotaelven), G. Willock. Teknisk Ukeblad (Oslo), vol. 75, no. 2, Jan. 13, 1928, pp. 15–19, 9 figs. Describes advantageous utilization of head of only 6.5 m. connected with seven propeller turbine units; Lawaczeck turbines; details of construction and operation of two 11,000-hp. Lawaczeck turbines in contrast with Kaplan turbine.

HYDROGEN

Atomic, Use in Research. Atomic Hydrogen as an Aid to Industrial Research, I. Langmuir. Science, vol. 67, no. 1730, Feb. 24, 1928, pp. 201–208. History of gas-filled lamp research work at laboratory of General Electric Co.; peculiar phenomena observed in studying effect of hydrogen; studies of heat losses from filaments of various diameters at incandescent temperatures; invention of gas-filled lamp is nearly direct result of experiments made for purpose of studying atomic hydrogen. Address given at joint meeting of Soc. of Chemical Industry, Société de Chimie Industrielle, American Chemical Soc. and American Electrochemical Soc.

I

INDUSTRIAL MANAGEMENT

Inventory Control. Inventory Control Doubled Our Stock Turnover, E. P. Miller. Factory, vol. 75, no. 2, Feb. 1928, pp. 298–301, 5 figs. Stock-limit control plan applied by Liquid Carbonic Corp.; slashed inventory and got rid of dead items; savings made possible by design of interchangeable unit parts; control card carried for each item of stock complete history and record of orders for main office and for each branch; application of Gantt chart;

no substitute for individual judgment in inventory control.

Lot Sizes, Economic. Economic Manufacturing Lot Sizes. Mfg. Industries, vol. 15, no. 2, Feb. 1928, pp. 151–152. Existing formulas have been carefully investigated and elements contained in each have been correlated into new formula taking account of all important factors which properly enter into such calculation; work was done by F. E. Raymond who presented his findings and new formula in paper before Am. Soc. Mech. Engrs., used as basis for present data sheet.

Production Control. Handling Large Production in Metal Stamping, R. Schmidt. Am. Mach., vol. 68, no. 9, Mar. 1, 1928, pp. 357–358, 5 figs. Large-scale production of sheet-metal parts invariably requires rapid movement of work in process, and quick turnover of material; methods of Westinghouse Elec. & Mfg. Co. in controlling its press department; 20,000 separate items in process of manufacture every month; ratio of non-productive labor and of material higher than plant average, and must be offset by rapidity of handling work in production.

Production and Wage Plans at an Equipment Factory, C. E. Wilson. Soc. Automotive Engrs.—Jl., vol. 22, no. 3, Mar. 1928, pp. 377–379 and (discussion) 379–381. Procedure for production planning, purchase control and wage payments at Anderson factory of Delco-Remy Corp.; working on basis of monthly schedules, instead of annual contracts for definite quantities, has made possible great increase in rate of turning over material; many wages are paid on group-premium basis; wage premiums for foremen, inspectors, toolmakers and tool designers came in for discussion.

Reorganization. Reorganization Under Scientific Management, W. R. Williamson. Soc. Indus. Engrs.—Bul., vol. 10, no. 1, Jan. 1928, pp. 3–26, 17 figs. Objects and definition of scientific management; selection of competent consultant or supervisor; audit and preparation of budget; presents typical sheets from mnemonic system of classification; standardization of tools and establishment of toolroom storeroom; reorganization of purchasing system; timekeeping and payroll system; routing; time study and rate setting; cost and accounting system; statistical records.

Research. Present Status of Management Research Methods, C. S. Yoakum. Am. Mgmt. Assn.—Proc. of Inst. of Mgmt., no. 4, 1928, pp. 3–31, and (discussion) 32–35. Discusses two problems, one of which presented itself as study of large accumulation of data on effects of certain procedure in use; data needed to be presented in form such that human mind could encompass them; second problem involved description of existing human social adjustments in group about four times as large as first; as before, case methods was inadequate; discussion from accounting, actuarial, industrial-engineering, marketing, and personnel point of view.

Small Businesses. What Chance Has the Small Business? C. R. Anderson. Factory, vol. 75, no. 2, Feb. 1928, pp. 286–288, 4 figs. Method of searching out something to offset every advantage enjoyed by big business; drive on overhead and on non-productive labor and common labor; watched every dollar of intangible labor cost resolve into cost of product; studied-out schedules; rearranged packing; complete survey of heating furnaces; every single operation in shop examined; salesmen studied; developed improved products.

INTERNAL-COMBUSTION ENGINES

Indicator Diagrams. Practical Conclusions from Indicator Diagrams of Internal-Combustion Engines Making Use of Equation for Polytropic Changes of State (Praktische Schlussfolgerungen aus Indikatordiagrammen von Verbrennungsmotoren unter Benutzung der Gleichung fuer polytropische Zustandsaenderungen), W. Biermann. Waerme (Berlin), vol. 51, no. 5, Feb. 4, 1928, pp. 87–92, 13 figs. Points to necessity of continuous inspection of large gas engines and gives graphic-logarithmic method for determining exponents of compression and expansion lines.

Indicator for. An Electrical Indicator for High-Speed Internal-Combustion Engines, J. Obata and Y. Yosida. Tokyo Imperial Univ., Aeronautical Research Inst.—Report, vol. 2, no. 28, Dec. 1927, pp. 397–405, 10 figs. Indicator described of simple disk form; very thick steel disk, 2 mm. thick and 5 cm. in diam.; extremely sensitive electrical means of measuring; generating valve circuit for recording minute motion of thick disk caused by pressure in cylinder; records of actual engine pressure obtained by means of Einthoven string-galvanometer, Lutz-Edelmann string electrometer and Duddell oscillograph.

Performance Testing. Improving Engine Performance, H. M. Jacklin. Soc. Automotive Engrs.—Jl., vol. 22, no. 3, Mar. 1928, pp. 337–344, 13 figs. Tests to secure improvement of internal-combustion-engine performance; multiple ignition increases power about 9 to 10 per cent at full throttle and generally gives smoother operation; increasing compression ratio from 5.3 to 1 to 10 to 1 resulted in 13 per cent increase in power; operating engine on constant-compression principle resulted in fuel saving of us much as 34 per cent; fixed spark is entirely feasible under constant-compression operation.

Pistons, Aluminum-Alloy. Aluminum-Alloy Pistons in Gasoline and Oil Engines, H. A. Huebotter. Soc. Automotive Engrs.—Jl., vol. 22, no. 3, Mar. 1928, pp. 325–330, 8 figs. Aluminum-alloy pistons are now also made for oil engines with bores up to 18 in., as well as for small gasoline engines; expansion controlled by steel bands embedded in aluminum but not bonded thereto; slots cast in piston allow for linear expansion of alloy without corresponding increase in piston diameter and change in cylinder clearance; advantages of strut-type pistons shown by thermal diagrams.

Thermal Efficiency. Comment on Report of Heat Engine Trials Committee, D. Clerk. Gas and Oil Power, vol. 23, no. 269, Feb. 2, 1928, pp. 85–87, 4 figs. Discussion of ideal efficiency standards for four distinct engine cycles; constant-volume, constant-pressure, Diesel and Atkinson cycles; abstract of paper brought forward for discussion at Institution of Civil Engineers; method of calculating formula for Diesel cycle; Atkinson cycle quite unsuitable for any engine of any other cycle.

Standards of Thermal Efficiency for Internal Combustion Motors, D. Clerk. Instn. Civil Engrs.—Proc. (Lond.), no. 4670, 1928, 18 pp., 4 figs. Discussion of report of Heat Engine Trials Committee; ideal efficiency standards for four distinct engine cycles; constant volume, constant pressure, Diesel and Atkinson cycles taken up; points in which author disagrees with Committee and new values computed for them; necessity of calculating temperatures corresponding to each cycle; Committee's proposal to adopt Atkinson cycle instead of actual cycle of operations as standard for all types of engine criticized.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON CASTINGS

Heat Treatment. Gray Iron Castings Heat Treated. Iron Age, vol. 121, no. 10, Mar. 8, 1928, pp. 663–664, 3 figs. Smaller parts, some sand cost and others made in permanent molds, pass through continuous furnaces at Ford plant; heat treatment before machining eliminates hard spots; metal softer and easier to machine; after annealing drilling is done more rapidly and there is less breakage of drills; castings made in permanent molds; furnaces and heat-treatment process.

L

LATHES

German Production Machines. Lathe Construction Filling Requirements of Modern Scientific Management (Erfuellung betriebswissenschaftlicher Forderungen durch den Drehbankbau), M. Kronenberg. Werkstattstechnik (Berlin), vol. 4, Feb. 15, 1928, pp. 89–91, 9 figs. Discusses what should be required of up-to-date lathes and how these requirements of scientific management are met by the Franz Braun (of Zerbst) and similar lathes.

LIFTING MAGNETS

Design and Construction. The Design and Construction of Lifting Magnets. Mech. World, vol. 83, no. 2142, Jan. 20, 1928, p. 47, 2 figs. Lifting magnets for handling materials in iron and steel industry; subjected to arduous service and rough handling; body of modern magnet made of high-permeability dynamo steel; assembly; magnet subjected to 20-in. vacuum then pressure of 100 lb.; result of moisture in interior of magnet; lifting capacities.

Lighting of High Bays in Industrial Plants, D. H. Tuck. Indus. Eng., vol. 86, no. 2, Feb. 1928, pp. 60–61, 7 figs. Tabloid presentation with illustrations of schemes for lighting high bays in shops with craneways.

LOCOMOTIVE BOILERS

Design. The Design and Proportion of Locomotive Boilers, C. A. Brandt. Ry. Age, vol. 84, no. 10, Mar. 10, 1928, pp. 575–579, 7 figs. Discusses problems of boiler and superheater, or steam-producing part of locomotive; design of boiler and superheater determine not only efficiency at which steam is produced, but also efficiency and capacity of locomotive; speed factor; general boiler design; water-tube firebox; results obtained with superheater.

Large. A Large Canadian Locomotive Boiler. Eng. and Boiler House Rev., vol. 41, no. 8, Feb. 1928, p. 386, 1 fig. Boiler is of straight-top type with radially stayed firebox, and shell is made of high-tensile silicon steel developed by Carnegie Steel Co., having tensile strength of 70,000 to 83,000 lb., and minimum yield point of 38,000; steel staybolts are used throughout; locomotive is lagged with 85 per cent magnesia.

LOCOMOTIVE REPAIR SHOPS

Illinois Central System. A Modern Boiler Shop For Railroad Repairs. Am. Mach., vol. 68, no. 9, Mar. 1, 1928, pp. 373–375, 8 figs. Layout of boiler shop of Illinois Central System and some of production equipment used in making repairs; machines for hot and cold flanging; 2100-ton Southwark flanging press and 66-in., 100-ton Chambersburg sectional flanging press hydraulically operated; radial drill mounted on rails; automatic machine for drilling staybolts; machine for grinding superheater joints.

Blacksmith Shop Layout at Paducah, F. W. Curtis. Am. Mach., vol. 68, no. 10, Mar. 8, 1928, pp. 415–416, 4 figs. Layout and equipment of blacksmith department of Illinois Central system; seven steam hammers of single- and double-arch type, ranging in capacity from 1000 to 5000 lb.; two smaller hammers, used exclusively for tool work; seven forging machines; car-type furnaces; welding department has shape-cutting machine, annealing furnace, racks for patterns and laying-out tables.

LOCOMOTIVES

Central Railroad of N. J. Passenger and Switching Locomotives for the C.R.R. of N.J. Ry. Age, vol. 84, no. 9, Mar. 3, 1928, pp. 540–542, 2 figs. 4–6–2 and 0–8–0 types purchased to meet demands for greater capacity in passenger and yard service; eight-wheel switchers designed with tractive force of 61,422 lb.; 4–6–2 type locomotives designed to handle heaviest through traffic; total weight of 4-6-2-type locomotives, loaded, is 326,470 lb.; tractive force is 46,840 lb.

High-Pressure. High-Pressure Steam in Locomotives, E. C. Schmidt. Sci. Am., vol. 138, no. 3, Mar. 1928, pp. 210–213, 7 figs. Tendency is toward still higher steam pressure to obtain greater tractive effort and fuel economy; design of five locomotives which will carry steam pressure in excess of 300 lb. per sq. in., in Horatio Allen, ordinary firebox is replaced by two small-diameter drums which extend forward over main shell and communicate with its steam space; design of jackets for exposed parts; in locomotive built for German State Railways 850-lb. steam is used first in centrally placed high-pressure cylinder.

Oil-Burning. Furnace Conditions in Oil Burning Locomotives, G. M. Bean. Pac. Ry. Club—Proc., vol. 11, no. 9, Dec. 1927, pp. 9–23. Study of conditions in oil-burning locomotive furnace because it offers problems not met with in use of other fuels; what is required in furnace designed for proper handling of liquid fuel; flame study as pertaining to furnaces operating in higher temperature ranges.

Oil-Electric. Battery-Oil-Electric Locomotive. Ry. Age, vol. 84, no. 9, Mar. 3, 1928, pp. 525–527, 3 figs. Novel type of motive power is being tried by New York Central, for operation in freight yards on west side, New York City; locomotive is equipped with storage battery of relatively large capacity; 300-hp. oil engine direct connected to 200-kw. generator is provided for charging battery; third-rail shoes are provided and also overhead collector; mechanical design; traction motors.

Steam-Turbine (Ljungström). New Turbine Locomotive Constructed in Manchester, England. Commerce Reports, no. 6, Feb. 6, 1928, p. 349, 1 fig. 2000-hp. Ljungström turbine locomotive, designed to haul English express trains at speed of 75 miles per hour; total weight, about 144 gross tons; is capable of developing drawbar pull of more than 18 tons.

Three-Cylinder. New Haven Acquires Ten Three-Cylinder Locomotives. Ry. Age, vol. 84, no. 8, Feb. 25 (Section 1), 1928, pp. 452–454, 6 figs. Engines of 4–8–2 type equipped with McClellon fireboxes; Bean smokeboxes and cast-steel cylinders; with boiler pressure of 265 lb., driving-wheel diameter of 69 in. and weight on drivers of 260,000 lb., these locomotives will develop tractive force at 85 per cent cut-off, of 71,000 lb.; and will pull, at passenger-train speed, 100 loaded cars weighing 5000 tons; other changes in locomotives.

LUBRICATING OILS

Automotive, Viscosity of. Motor-Oil Characteristics and Performance at Low Temperatures, R. E. Wilkin, P. T. Oak, and D. P. Barnard, 4th. Soc. Automotive Engrs.—Jl., vol. 22, no. 2, Feb. 1928, pp. 213–220, 12 figs. Experimental study of viscosity characteristics of motor oils at low temperatures; their influence upon cranking torque and circulation within engine; circulation tests in engine equipped with comparatively small-mesh screen over pump intake; circulation not obtained until oil in sump attained pour-point temperature; free circulation requires oil, effective viscosity of which does not increase too rapidly at very low shearing stresses.

M

MACHINE TOOLS

Manufacture. Time-Saving Devices in the Landis Shop. Machy. (N. Y.), vol. 34, no. 7, Mar. 1928, pp. 495–497, 6 figs. Number of time- and labor-saving devices, tools, and fixtures employed in shops of Landis Machine Co.; fool-proof indexing fixture; fixture for milling slots in die-head bodies; turret tool for grooving gear blanks; fixture for inspecting cutters; fixture for boring hole in correct location relative to inclined surface.

MANGANESE STEEL

Machining. Machining Manganese Steel on a Commercial Basis, A. S. Martin. Iron Trade Rev., vol. 82, no. 9, Mar. 1, 1928, pp. 564–565. Tests on cutting capacity of new type of high-speed steel conducted by Firth-Sterling Steel Co.; cutting medium gives greater production than standard high-speed steels; cutting manganese steel; tests carried on under ordinary machine-shop conditions; chip formed was very tight and compactly curled ribbon of deep blue or brownish gunmetal color; firm chucking desirable.

MATERIALS HANDLING

Construction Work. Conveying and Handling of Materials in Construction Work (Die Bedeutung des Foerderwesens im Baubetrieb), G. Garbotz. Foerdertechnik u. Frachtverkehr, vol. 21, no. 1, Jan. 6, 1928, pp. 10–15, 11 figs. Difference between factory and construction job management; review of recent German practice in excavation, dredging, loading and unloading, scraping and dragging, transportation and distribution of concrete mix, German concrete distribution plant for construction of Shannon River dam in Ireland.

Industrial Plants. Efficient Handling in Industrial Plants (Was leistet wirtschaftliche Flurfoerderung), H. Hellmich. Foerdertechnik u. Frachtverkehr, vol. 21, no. 1, Jan. 6, 1928, pp. 3–10, 14 figs. Review of standardization and other work by German Committee on Economic Production; general theoretical principles of transportation and their bearing on planning of transportation systems and design of equipment; number of examples from practice showing economic value of application of theoretical principles; standardization of hand trucks, cranes and other handling equipments.

Mechanical Handling of a Variety of Products Cuts Costs 25 Per Cent, B. Finney. Iron Age, vol. 121, no. 8, Feb. 23, 1928, pp. 524–528, 7 figs. That materials-handling methods widely adopted by companies concentrating on mass production of single article can be successfully applied by smaller metal-working plants is experience of Hobart Brothers Co., Troy, Ohio; direct progression of materials from receiving doors through various departments to final assembly and shipping room facilitated by use of conveyors and trucks.

Railway Repair Shops. Canadian Pacific Puts Supply Work on Wheels. Ry. Age, vol. 84, no. 7, Feb. 18, 1928, pp. 396–398, 6 figs. New ideas in materials-handling factors in low stock balance and stores expense; at Angus shops in Montreal, system of handling material for shipment is developed to particularly high degree; distinguishing and most interesting feature of transfer operation between stores lies in method of shipping those supplies which, because of their small size, delicate construction or value, are particularly subject to loss, breakage or theft.

I. C. Improves Material Handling, W. S. Morehead. Ry. Age, vol. 84, no. 10, Mar. 10, 1928, pp. 580–583, 10 figs. At Burnside plant of Illinois Central in Chicago where general store and principal shop of railroad are located, study has been made of materials-handling methods and costs; operations speeded 50 per cent; all handling centralized; material stored on skids; special construction facilitates handling; receive supplies from dealers on skids; savings large.

METALS

Cutting. The Relation of Depth of Cut to Feed on a Shaper, D. L. Perkins. Am. Mach., vol. 68, no. 7, Feb. 16, 1928, pp. 305–306, 6 figs. Tests to determine on power-consumption basis, advantage or disadvantage of deep cuts with light feeds over shallow cuts with heavy feeds for different numbers of strokes per minute; cutting speeds of 9, 13, and 19 strokes per min.; 32-in. Invincible Type Gould & Eberhardt shaper, motor-driven and other instruments used; power consumption least with shallow cut and wide feeds.

Drawing. Properties and Tests of Thin Plates for Drawing Processes (Pruefung und Eigenschaften von Feinblechen fuer Ziehzwecke), W. Aumann. Maschinenbau, vol. 7, no. 3, Feb. 2, 1928, pp. 105–110, 18 figs. Apparatus and methods for testing thin plates used in drawing of hollow cylindrical parts; Erichsen apparatus and cupping test for determining texture of plate; bending and hardness tests; discusses fluting of rims; criticizes A.E.G. stamping test.

Fatigue. Fatigue Phenomena, H. J. Gough. Engineering, vol. 125, nos. 3240 and 3241, Feb. 17 and 24, 1928, pp. 200–201 and 232–233. Feb. 17: Review of first of series of Cantor lectures presented at Roy. Soc. of Arts; fatigue of metals is defined as behavior of metals under repeated cycles of stress; mathematical theory of elasticity indicates clearly that uniform stress distribution would not be obtained at any cross-section where form or size was changing, and that, where change was rapid, stress concentration effects produced would be large. Feb. 24: Second Cantor lecture made special reference to single crystals; reviews three epochs in history of fatigue testing; one of more interesting phenomena is fact, regarded as definitely established, that metal subjected to repetitions of safe range of stress finally achieved state in which, although no further permanent set would appear, strain hysteresis was present, and would persist indefinitely without causing fracture of material.

Rolling. Metallic Flow During Rolling, C. H. Mathewson. Iron Age, vol. 121, no. 10, Mar. 8, 1928, pp. 666–667 and 710, 4 figs. Plastic flow of metal upon rolling or forging; formation of twins in original crystals is often earliest effect of overstrain; subsequent severe deformation is combination of two processes, viz., development of crystalline twins, and of slip along crystal planes; twinning is action requiring small atomic displacements; recrystallization starts at twin boundaries. Abstract of paper presented before Inst. of Metals.

Upsetting Tests. Technical Upsetting Problems (Technische Stauchprobleme), E. Siebel. Archiv fuer das Eisnhuettenweseh (Duesseldorf), vol. 1, no. 8, Feb. 1928, pp. 543–548, 13 figs. Stress conditions in technical upsetting process; influence of friction on deformation; conical upsetting process; strain distribution in connection with stretching; stress conditions with rolling and spreading; transverse upsetting of cylindrical bodies; hole formation with diagonal rolling.

X-Ray Analysis. X-Rays: A New Tool in the Foundry. Iron Age, vol. 121, no. 10, Mar. 8, 1928, pp. 655–656, 4 figs. Examination of X-ray before machining castings reveals hidden defects and reduces foundry costs; two cases cited; with gray iron or steel castings it is now possible to X-ray through thickness of $3^1/_2$ in.; such flaws as blowholes, cracks, bubbles and foreign material are relatively easy to detect in one or two exposures; X-ray equipment of low cost utilized for aluminum-alloy castings; examining first run of castings.

High Speed, High Voltage X-Ray Diffraction Analysis of Metals, A. St. John. Am. Soc. Steel Treating—Trans., vol. 13, no. 3, Mar. 1928, pp. 485–492, 5 figs. Quick and convenient method of X-ray diffraction analysis is modification of usual "pinhole" method using tungsten radiation at 200,000 volts as in radiographing castings, so that powerful beam passes through $^1/_8$ inch of steel; exposures of two hours or less are sufficient; method has been applied to brass, tin and steel in study of mechanical working, heat treatment, extrusion, aging and effect of exposure to gases.

MILLING CUTTERS

Standards. Milling Cutters and Arbors. Soc. Automotive Engrs.—Jl., vol. 22, no. 3, Mar. 1928, p. 321, 1 fig. Proposed keys and keyways standards submitted for review by industrial users; drawn up by Committee on Milling Cutters; table showing figures for diameter of arbor, nominal width of key, arbor and keyseat, bore and keyway, and arbor and key.

MOTOR BUSES

Design Trends. Current Trends in Motor Bus Design. Automotive Industries, vol. 58, no. 7, Feb. 18, 1928, pp. 264–265, 9 figs. Charts showing, in comparison with former years, number of cylinders, tire equipment, transmission, source of current, final drive, rated horsepower, chassis weight, service brakes, and wheelbase.

MOTOR TRUCKS

Design Trends. Current Trends in Motor Truck Design. Automotive Industries, vol. 58, no. 7, Feb. 18, 1928, pp. 274–275, 7 figs. Charts showing design trends in motor trucks compared with former years; service brake equipment; clutch type; final drive; number of cylinders; rated horsepower; models by tonnage; number using stock engines.

N

NOZZLES

Discharge from. Discharge from Nozzles and Orifice Plates Adequately Expressed by Most Elementary Formula (Anwendbarkeit der einfachsten Durchflussformel fuer Duesen und Stauraender), W. Fritz. V.D.I. Zeit., vol. 72, no. 4, Jan. 28, 1928, pp. 116–118, 1 fig. Compares various published formulas for discharge of gases and steam from nozzles and orifices and points out that most elementary formulas is adequate if mean average pressure be taken instead of either inlet or outlet pressure; relation between Reynolds coefficient and discharge coefficient of standard nozzles.

Steam. Fifth Report of the Steam Nozzles Research Committee. Engineering, vol. 125, no. 3238, Feb. 3, 1928, pp. 147–148, 7 figs. Tests to determine effect of surface finish; and effect of shape of exit; tests were made under different conditions as to pressure range from those which had been previously used; pressure in receiver was maintained at about 60 lb. per sq. in., and initial pressure was adjusted to give velocities of steam jet at exit extending up to velocity of sound in steam; nozzles tested were convergent impulse nozzles, with nominal angle of 20 deg.

O

OIL ENGINES

Double-Acting (Sulzer). A 2000-B.hp. Experimental Oil Engine. Engineer, vol. 145, no. 3760, Feb. 3, 1928, p. 138, 1 fig. Results of lengthy and successful trials of single-cylinder, double-acting, two-cycle experimental unit built by Sulzer Bros. at Winterthur, Switzerland; one outstanding feature of engine is use of hydraulically operated airless-injection fuel valves in lower cylinder.

Heavy-Oil. A 1750 B.H.P. Six-cylinder Heavy-Oil Engine. Engineer (Lond.), vol. 145, no. 3763, Feb. 24, 1928, pp. 200–204, 13 figs. Account of origin of design, its principal technical features, together with details of engine performance; supplied by General Elec. Co.; makers claim for their engine that design of parts subjected to heat brings about satisfactory solution of problem of combustion-chamber construction, as method possesses means of dissipating heat without setting up harmful heat stresses.

Supercharging. The Sulzer System of Supercharging. Am. Soc. Naval Engrs.—Jl., vol. 40, no. 1, Feb. 1928, pp. 151–154, 2 figs. With object of obtaining more power from given cylinder volume than is possible with their standard system of scavenging, with double row of superimposed ports, Sulzer Bros., Winterthur, Switzerland, have developed new method of supercharging two-stroke cycle heavy-oil engines of their design, whether land or marine type.

ORDNANCE MANUFACTURE

Watertown Arsenal. Making Big Guns at the Watertown Arsenal, J. B. Nealey. Machy. (N. Y.), vol. 34, no. 7, Mar. 1928, pp. 542–545, 10 figs. Some of unusual equipment and few of outstanding operations; guns ranging in size from $1^1/_2$ in. to $9^1/_2$ in. are manufactured, starting with making of steel, for which three large open-hearth furnaces with all necessary auxiliary equipment are provided; heat treatment of gun forgings; laboratories are engaged in research and testing; new method of making guns without outer jackets.

OXYACETYLENE CUTTING

Economical. Factors Involved in Economi-

cal Gas Cutting, J. C. Anderson. Am. Welding Soc.—Jl., vol. 7, no. 1, Jan. 1928, pp. 22–30, 3 figs. Deals specifically with cutting performed on steel plates, but statements made are just us applicable to cutting operations on steel castings, or forgings; with these important factors which affect cutting results recognized and put into practice and conscientiously followed, there will result economical use of oxyacetylene process.

Speed with Oxygen. Cutting Speed with Oxygen, J. L. Anderson. Rly. Jl., vol. 34, no. 3, Mar. 1928, pp. 29–30. Standard practice in computing cutting costs, in rating operators or in otherwise establishing values, to compare time, oxygen, fuel gas and labor cost in relation to square inches cut, considering one cut surface only; table is presented giving results obtained by seven different cutting operators working on same grade and thickness of material. Abstract of paper read before Univ. of Minn. Welding Conference.

OXYACETYLENE WELDING

Car Shops. Cutting and Welding in the Shop, W. A. Lacke and W. H. Dreis. Heat Treating and Forging, vol. 14, no. 2, Feb. 1928, pp. 150–151. Two papers that bring out importance of modern methods in car building and in manufacture of heavy machines; striking instances cited; piping from generators; cases of difficult jobs. Presented at Int. Acetylene Assn.

Power-Plant Piping. Welding of Power Plant Piping, A. W. Moulder. Welding Engr., vol. 13, no. 2, Feb. 1928, pp. 27–31, 9 figs. Research of pipe fabricator has developed design and procedure which insure satisfactory results on every welded installation; deals particularly with oxyacetylene welding, but data may be equally applicable to arc welding; proper materials, tools, methods and instruction; shape of welded fillet; testing of welders; behavior of welds under high pressures and temperatures. Paper presented at joint meeting of Am. Soc. Mech. Engrs. and Am. Welding Soc.

Reducing Cost of. New Processes Reducing the Cost of Oxyacetylene Welding (Verbilligung der Gasschmelzschweissung durch neue Schweissverfahren), C. F. Keel. Maschinenbau, vol. 7, no. 3, Feb. 2, 1928, pp. 110–112, 4 figs. Investigates effect of angles of incidence of torch and rod in oxyacetylene welding; gives correct positions and angles of incidence of torch and rod with reference to sheets of plates of various thicknesses whereby 30 per cent increase in efficiency can be attained.

P

PLATE-BENDING MACHINES

Hydraulic. Vertical Plate-Bending Machine of the Hydraulic Type. Ry. Engr., vol. 49, no. 577, Feb. 1928, pp. 54–55, 10 figs. Describes principles of machine, used in L. M. S. R. locomotive shops, and built by Hugh Smith & Co., Glasgow; built primarily for use in marine boiler shops, but they proved themselves so useful that they have been introduced with great success for locomotive boiler work; capacity of machine; principle of machine; bending cylinders; traversing plate.

POWER PLANTS, STEAM

High-Pressure. Operating Experience with High Pressure and High Temperature Steam, G. A. Orrok. Power, vol. 67, no. 8, Feb. 21, 1928, pp. 339–341. Author has endeavored to collect particulars of all high-pressure installations in operation or under construction at present time and these data are given in table; there appear to be no serious difficulties in operation of plants using pressures up to 2000 lb. per sq. in.; 4 years' experience in continuous operation of superheaters raising steam temperatures to 850 deg. fahr. with ordinary steel superheater tubes has proved such operation commercial. Paper presented at Mid-West Power Conference, Chicago.

Industrial. Industrial Plant Effects Marked Saving. Power Plant Eng., vol. 32, no. 4, Feb. 15, 1928, pp. 233–237, 5 figs. Pittsburgh Plate Glass Co.'s new $226,000 power plant saves $47,000 during first year's operation; effective use of instruments assured by incorporating their readings in accounting-department report; both high- and low-pressure process steam and electric power used in plant, some of power being generated in back-pressure turbine, some of it being purchased from Milwaukee Electric Railway and Light Co.

POWER PLANTS, STEAM-ELECTRIC

Cinder-Cone Installation. Cinder Cones and Induced-Draft Fans Installed in Steam Plant, W. A. Scott. Eng. Wld., vol. 32, no. 2, Feb. 1928, pp. 70–71, 1 fig. Installation of cinder cones and induced-draft fans at steam-electric and central steam-heating plant of Northwestern Electric Co., Portland, Ore., results in greater economy of fuel and obviates deposition of cinders and ash on adjacent premises; it is roughly estimated that about 95 per cent of solids discharged from fireboxes are recovered by cinder cones and returned as fuel.

High-Pressure. Operating Experiences with 1300-lb. Pressure, J. Anderson. Power Plant Eng., vol. 32, no. 4, Feb. 15, 1928, pp. 229–232, 4 figs. Summary of operating experiences and difficulties encountered during period of 11 months at Lakeside station, Milwaukee, Wis.; experiences with tube failures from scale formation; boiler-tube corrosion troubles; chemical control of feedwater and resulting correction of trouble. Abstract of paper presented before Inst. of Fuel, London.

Great Britain. Billingham's New High-Pressure Steam Plant. Chem. Age, vol. 18, no. 448, Jan. 28, 1928, p. 70. Largest high-pressure plant in world; volume of steam to be dealt with from this plant every 24 hours will amount to 11,700 tons, this being passed through high-pressure turbines for production of electricity; advantages of pulverized fuel.

PRESSES

Stamping. Recent Progress in Construction of Stamping Presses (Neues auf dem Gebiete des Praegepressen-Baues), O. Kuehner. Maschinenbau (Berlin), vol. 7, no. 4, Feb. 16, 1928, pp. 159–160, 4 figs. Results of practical experience with drop presses, hydraulic presses, and friction-drive screw presses led to construction of toggle point press particularly adapted to precise calibrated stamping.

PRESSURE VESSELS

Welding. Fabricating Pressure Vessels from Inch-and-a-Quarter Plate. Iron Trade Rev., vol. 82, no. 10, Mar. 8, 1928, pp. 622–623, 4 figs. Construction of pressure vessels, 6 ft. in diameter by 26 ft. in length, and designed for 300 lb. operating pressure; welding reinforcing ring to manhead; welding of head seam; providing for contraction. Abstract from Oxyacetylene Tips.

R

RAILWAY MOTOR CARS

Gasoline-Electric. Gas-Electric Self-Propelled Car, Toronto, Hamilton & Buffalo Railway. Can. Ry. and Mar. World, no. 360, Feb. 1928, pp. 93–94, 2 figs. Seating capacity is 37 in main room and 10 in smoking room; power is supplied by Winton 6-cylinder 275-hp gasoline engine, with cylinders $7^1/_2 \times 8^1/_2$ in.; 1050 r.p.m.; electrical equipment consists of General Electric Co. 180-kw. generator driven by gasoline engine; car has replaced steam train, consisting of locomotive, combination baggage car and smoker, and first-class car.

Storage-Battery. Railway Motor Cars with Storage Batteries (Communication sur les Automotrices Electriques à Accumulateurs), L. Jeancard. Industrie des Voies Ferrées et des Transports Automobiles, vol. 21, no. 252, Dec. 1927, pp. 534–543 and (discussion) 543–545, 11 figs. Use of storage-battery rail cars in different countries; description of chassis body, mechanisms and electric equipment, starting, lighting, mercury-arc rectifiers, etc., of type developed in France; results of tests of these rail cars.

REFRACTORIES

Properties of. The Important Properties and Requirements of Some Special Refractories, M. F. Beecher. Am. Soc. Steel Treating—Trans., vol. 13, no. 3, Mar. 1928, pp. 473–483 and (discussion) 483–484 and 492, 2 figs. Author points out how fused alumina, silicon carbide and combinations of silica and alumina as now manufactured offer properties which are superior to those of clay refractories; these manufactured refractories are all electric-furnace products and are obtained under variety of trade names; common causes of failure in refractories.

REFRIGERATION

Adsorption System. A New Simple Process for Producing Very Low Temperatures (Ein neues einfaches Verfahren zur Erzeugung sehr tiefer Temperaturen), F. Simon. Zeit. fuer die gesamte Kaelte-Industrie, vol. 34, no. 12, Dec. 1927, pp. 217–221, 4 figs. Reports experiments, made in institute for physics and chemistry of the University of Berlin, on cooling by means of reversing process of gas adsorption; proposes to use zeolites, such as chabasite, as adsorbents.

ROLLING MILLS

Blooming Mills, Germany. Modern Reversing Mills (Neuzeitliche Umkehrblockwalzwerke), F. Funke. V.D.I. Zeit. (Berlin), vol. 72, no. 7, Feb. 18, 1928, pp. 197–201, 13 figs. partly on supp. plates. Evolution of modern reversing blooming mill; what is required of them; construction and layout; drawings and descriptions of 1150-mm. blooming mills of August Thyssen metallurgical works at Hamborn and of Phoenix works in Duisburg-Ruhrort.

Disk. Disk Rolling with Special Reference to Steel Differential Cases. Iron Age, vol. 121, no. 10, Mar. 8, 1928, p. 659, 1 fig. New method of steel working found in production of steel differential case for automobiles; machines rolling radially; production of about 10 disks per minute; proper speed relation to prevent distortion; each disk driven by 150-hp. motor; provision for lubrication.

Seamless Tube Mill. A Newly Constructed Seamless Tube Mill, C. A. Colgate. Blast Furnace and Steel Plant, vol. 16, no. 2, Feb. 1928, pp. 240–241 and 248, 2 figs. Standard Seamless Tube Co. has installed at its Ambridge plant new 51-in. roll-type piercing mill with several innovations in design from conventional-type piercing mill; designed and built by Mesta Machine Co. with Standard Seamless Tube Co. collaborating in design; is largest of its type so far built in United States, if not in world.

S

SAWS

Metal-Cutting, Electrothermal. Electrothermal Saws (Elektro-Trennmaschinen nach dem elektrothermisch-mechanischen Verfahren), O. Neiss. Elektrotechnische Zeit., vol. 49, no. 3, Jan. 19, 1928, pp. 83–88, 13 figs. Circular saw for cutting heavy structural-steel sections quickly and cleanly; low-voltage but high-intensity current is passed between blade of saw and metal to be cut; arc formed at cut liquefies metal and hastens cutting speed; saw is combined with unipolar type of dynamo into one unit and is driven by 2000-r.p.m. motor. See brief translated abstract in Elec. World, vol. 91, no. 8, Feb. 25, 1928, p. 418.

SHAFTS

Force Fits. Researches Dealing with Force Fits of Steel Shafts. Soc. Mech. Engrs. (Japan)—Jl., vol. 31, no. 129, Jan. 1928, pp. 13–38, 20 figs. Experimental researches dealing with force fits of steel shafts on steel and cast-iron bosses; limiting value of allowances which practically produce permanent set on bosses; if greater allowance than limiting value should be given, both force-fit pressure and slipping resistance can never be increased at same rate; limiting value of allowance depends on material only and not on radial thickness of bosses. (In Japanese.)

SHAPERS

Power Required for Cutting. Relation of Shaper Stroke to Power Consumed, D. L. Perkins. Am. Mach., vol. 68, no. 10, Mar. 8, 1928, pp. 427–428, 5 figs. Tests showing that power decreases for increase in length of stroke; variations given for power consumed in removing definite amounts of metal at approximately constant cutting speed but for different lengths of stroke; curves show maximum power consumption on shaper with strokes of 4, 8, 12 and 18 in. for various materials under cut.

STEAM ACCUMULATORS

Haag. Installation of First Steam Accumulator of Haag Design (De eerste stoomaccumulator, systeem "Haag," in het grootbedrijf in werking gesteld), F. C. Huygen. Ingenieur (Hague), vol. 43, no. 5, Feb. 4, 1928, pp. 47–50, 2 figs. Describes construction and performance of Haag steam accumulator operating in conjunction with Lancashire boilers.

STEAM APPARATUS

Temperature-Control. Tag Steam Operated Controller. Instruments, vol. 1, no. 2, Feb. 1928, pp. 119–120, 3 figs. Device which utilizes portion of steam which heats apparatus to obtain enough power to work valve, opening and closing of which governs temperature of apparatus where one best temperature must be maintained; controller designed to operate on pressures between 5 and 100 lb.; furnished with 40-deg. range anywhere between limits of 95 and 290 deg. fahr.

STEAM GENERATION

Developments. Trend and Development in

Steam Generation, T. E. Murray. Power Plant Eng., vol. 32, no. 5, Mar. 1, 1928, pp. 322–323. Author does not believe that it will ever be expedient to standardize on given steam pressure for power stations; reference to binary-vapor system and also to Hartmann boiler in which water in closed system is heated in furnace and circulated through coil in drum where it generates steam from independent source of water; Loeffler and Benson boilers.

STEAM GENERATORS

Design. New Steam Generator Installation. Combustion, vol. 18, no. 2, Feb. 1928, pp. 102–106 and 128, 4 figs. Installation at Morgan & Wright Detroit plant of U. S. Rubber Co.; features incorporated are full water-cooled combustion-chamber walls, integral with circulatory system of generator, practical elimination of brickwork in furnace, water-screen, tangential firing; these features are discussed.

Pulverized-Coal. Steam Generator, Feature at New Staley Plant, Decatur, Ill. Power Plant Eng., vol. 32, no. 4, Feb. 15, 1928, pp. 242–248, 11 figs. New unit, burning pulverized coal and capable of producing 150,000 lb. steam per hr. controlled by push buttons from central control board; differs from ordinary boiler installation principally in that heating surface completely surrounds furnace and is integral part of combustion chamber; three outstanding features are: Use of coal in pulverized form; practical elimination of all brickwork in construction of furnace and large steam capacity per given cu. ft. of space occupied.

STEAM TURBINES

Blades, Manufacture of. The Production of Smooth Steel Sections with Special Regard to Steam-Turbine Blades (Die Herstellung blanker Stahlprofile unter besonderer Beruecksichtigung der Dampfturbinenschaufeln), F. Braun. Stahl u. Eisen, vol. 48, no. 4, Jan. 26, 1928, pp. 97–101, 9 figs. Describes process for production of iron and steel sections; design of hot and cold rolls; annealing and pickling; drawing of small sections; manufacture of turbine blades by hot and cold rolling and drawing; material employed and its strength requirements; testing to determine fracture resistance; process of continuous production up to finished blade.

Heat Recovery. Recoverable Thermal Energy in the Steam-Turbine Process (Die reuckgewinnbare Waerme im Dampfturbinen-Prozess), T. Bremi. Schweizerische Bauzeitung, vol. 91, no. 4, Jan. 28, 1928, pp. 41–44, 8 figs. General mathematical discussion of theory of steam-turbine design, provoked by the Blowney and Warren paper on "The Increase in Thermal Efficiency Due to Resuperheating in Steam Turbines;" definition of heat-recovery factor, heat-recovery factor of wet and superheated steam; heat recovery at high-pressure stage and its effect on overall efficiency of turbine.

Mixed-Pressure. Developing Power from a Factory Waste. Power, vol. 67, no. 11, Mar. 13, 1928, pp. 465–467, 3 figs. Mixed-pressure turbine uses exhaust of steam hammers in Henry Vogt Machine Co.'s plant; reduction in power costs is enough to repay investment in short time; diagrams of old power layout and new hook-up.

Zoelly. Tests of a 12,000-Kw. Zoelly Steam Turbine. Engineer (Lond.), vol. 145, no. 3762, Feb. 17, 1928, p. 177, 1 fig. Particulars of tests carried out by D. Dresden on turbine supplied to City of Leiden designed for normal steam pressure of 285 lb. per sq. in. and total temperature of 662 deg. fahr.

STEEL

Machinability Testing. Testing the Machinability of Materials (Die Pruefung der Bearbeitbarkeit), F. Rapatz and K. Krekeler. Stahl u. Eisen, vol. 48, no. 9, Mar. 1, 1928, pp. 257–261, 12 figs. Investigations of practical adaptability of different testing methods; tests were carried out on soft ingot steels, chromium-nickel steels, and tool steels, and include hardness drill test, tool-thrust test, torsion test, etc.; includes diagrams and photomicrographs.

Strength at High Temperatures. The Properties of Steel at High and Low Temperatures, A. Pomp. Metallurgist (Supp. to Engineer), Jan. 27, 1928, pp. 13–14, 2 figs. Work carried out at Kaiser Wilhelm Institut fuer Eisenforschung; empirical limit was assigned to stress for long life; effect of temperatures on properties of steel is bound up with method of loading; shows curves of impact strength against temperature for mild steel when subjected to different treatments; impact-strength determinations at various temperatures on chrome-nickel steel and 4-per cent silicon steel. Abstract translated from V.D.I. Zeit., Oct. 27, 1927.

The Strength of Steel at Elevated Temperatures with Particular Reference to Safety Factors, T. McL. Jasper. Power, vol. 67, no. 10, Mar. 6, 1928, pp. 446–447, 4 figs. Strain value in main cylinder, at unreinforced manways and ordinary dished head; strain values with reinforced manways and elliptical head; ordinary steel used in construction of pressure containers has yield point that is very pronounced; corrosion as factor; stress-time curves for two steels tested at 900 deg. fahr. Abstract of paper read before Am. Petroleum Inst., Dec. 1927.

STEEL CASTINGS

Shrinkage. Shrinkage and Contraction of Steel Castings, C. W. Sherman. Can. Ry. and Mar. World, no. 360, Feb. 1928, p. 81. Design must lend itself to perfection in formation while casting is changing from liquid to solid state without developing visible and invisible formation defects, or excessive contracting strains as casting cools to normal; design of any casting that approaches uniform section of metal will lend itself to great amount of perfection in formation of casting, and will eliminate trouble in service over long period of time.

Shrinkage of Steel Castings (Beitrag zur Schwindung von Stahlguss), F. Koerber and G. Schnitzkowski. Stahl u. Eisen, vol. 48, nos. 5 and 6, Feb. 2 and 9, 1928, pp. 129–135, 9 figs., and 172–178, 15 figs. Feb. 2: Discusses practical significance of shrinkage deformation and fractures due to variations in shrinkage; results of shrinkage tests on steel castings obtained from open-hearth furnaces with acid and basic processes; influence of chemical composition on shrinkage. Feb. 9: Investigations of crack formation; influence of chemical composition on shrinkage; movements of large gear and disk-wheel castings during shrinkage.

STEEL, HEAT TREATMENT OF

High-Temperature. High Temperature Processes, J. C. Woodson. Purdue Univ. Eng. Extension Dept.—Bul., vol. 11, no. 1, June, 1927, pp. 23–31. Brief summary of standard heat-treating processes that lie within temperature range of 1000 to 2000 deg. fahr. and notes regarding perfected apparatus available; annealing; heat treatment of metals; carburizing; normalizing; case-hardening; malleablizing; vitreous enameling of steel; vitreous enameling of cast iron; patenting of wire.

Quenching Stresses. Heat Stresses in Connection with Cooling or Refining of Large Hollow Cylinders (Waermespannungen beim Abkuehlen bzw. Vergueten grosser, hohlgebohrter Zylinder), E. Maurer. Stahl u. Eisen, vol. 48, no. 8, Feb. 23, 1928, pp. 225–228, 4 figs. Determination of temperature curves in quenching of hollow cylinders; exponential equation of heat conduction, and its solution; integral equation of tangential stress developed by Lorenz, and its solution; cylinder of chromium-nickel steel was used for investigation, and it was shown why hollow drilling greatly reduces stresses due to quenching.

Tempering Changes in Carbon Steel, R. Hay and R. Higgins. Roy. Tech. College—Jl. no. 4, Dec. 1927, pp. 62–76, 7 figs. Tempering changes which take place in quenched steels have been investigated by determining Brinell hardness number, specific volume, yield stress, maximum stress, percentage elongation, and Charpy impact value of specimens which had been water quenched from 1000 deg. cent. and tempered from room temperature to 650 deg. cent. at 25 deg. intervals.

Temperature Control. The Control of Temperature in Heat Treating, G. C. Davis. Heat Treating and Forging, vol. 14, no. 2, Feb. 1928, pp. 199–200. Final temperature of work being heated that is interesting; great steps forward have been made in an approach to this ideal heating by the growing use of liquids for heating; in case of carbon-steel hardening, there are great possibilities ahead for improving heating of work.

STOKERS

Traveling-Grate. Design and Application of Traveling-Grate Stokers, T. A. Marsh. Power, vol. 67, no. 8, Feb. 21, 1928, pp. 328–331, 5 figs. Natural-draft stokers; furnaces for natural-draft chain grates; supplying air for combustion; presents tables of standard setting heights for natural-draft chain grates, of test results with various fuels burned on natural-draft traveling stokers, and of operating records.

Design and Application of Forced Draft Chain Grates, T. A. Marsh. Power, vol. 67, no. 10, Mar. 6, 1928, pp. 414–417, 6 figs. Forced-draft traveling grates are well suited to burning of following fuels: anthracite, coke breeze, bituminous coal (free burning), sub-bituminous coal, lignite; furnace designs for forced-draft stokers differ from those of natural-draft stokers in that not as much arch is required for ignition of given amount of coal; test results with anthracite and coke breeze; forced-draft chain-grate stoker tests.

T

TEXTILE MACHINERY

Design. Important Influence of Rayon on the Design and Construction of Textile Machinery, F. W. Sturtevant. Textile World, vol. 73, no. 6, Feb. 11, 1928, pp. 29–30, 2 figs. Existing equipment refined to allow greater variety of constructions and better fabrics; shows how some of existing cotton, silk and wool machinery has been adapted to handle rayon; doubling and twisting machines; winding machinery; improvements in looms; dyeing equipment; finishing machinery.

TOOLS

Standardization. Advantages of Standard Tools for Quantity Production, M. E. Lange. Am. Mach., vol. 68, no. 6, Feb. 9, 1928, pp. 255–259, 20 figs. Examples of how careful planning can often save extra cost of special tools; special tools made costly by frequent changes in design of products; standard tools adapted to varying conditions and changes, and have longer useful lives; multiple turning head; large slide tool; no special tools used unless their reason for existence is proved on a "facts and figures" basis.

V

VACUUM

Measurement of. Practical Method for Measuring Low Pressures (Ueber eine praktische Methode zue Messung niedriger Drucke), H. Teichmann. Zeit. fuer Technische Physik, vol. 9, no. 1, 1928, pp. 22–26, 5 figs. Report from physical institute of Dresden Institute of Technology on application of indirect method of grid current measurement to ionization manometer determinations of vacuum, allowing satisfactory use of comparatively less delicate measuring instruments.

W

WASTE

Elimination of. Four Basic Principles of Reducing Waste, W. I. Ferris. Factory, vol. 75, no. 2, Feb. 1928, pp. 311–313, 4 figs. Problem of saving losses in material solved; preventing spoiled work; reducing scrap; recovering most of unavoidable scrap and putting it immediately in best form for use over again; recovering eventually all that is possible of indefinite vanished waste; reduction of waste prime reason for designing many machines, jigs, and other aids at plant of L. E. Waterman Co., of which author is vice-president.

WASTE HEAT

Recovery. Waste Heat Recovery, W. Gregson. Engineer (Lond.), vol. 145, no. 3763, Feb. 24, 1928, pp. 216–219, 6 figs. In first portion author deals with theoretical and arithmetical aspects of waste-heat recovery in steel works, in gas works and on ships fitted with oil engines; in second portion he deals with practical side of waste-heat recovery in same three connections. See also editorial comment on pp. 213–214.

WELDING

Electric. See ELECTRIC WELDING, ARC.

Oxyacetylene. See OXYACETYLENE WELDING.

WELDS

Brittleness of. Red-Shortness of Weld Metal, A. H. Gooder. Welding Engr., vol. 13, no. 2, Feb. 1928, pp. 39–43, 6 figs. British welding engineers investigate causes of brittleness of some welds at red heat, and means of controlling crystalline structure; many fusion welds red-short and particularly with electric arc welds; representative compositions of fluxes in commercial use; other effects of fluxes; passage of metal through arc; effect of carbon content of electrode on red-shortness of weld; tensile strength; bend tests; carbon contents of welds; microstructure; welds made in oxygen gas. Paper read before Instn. Welding Engrs.

THE ENGINEERING INDEX

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Mechanical Engineering Section

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AIR COMPRESSORS

Design. A Contribution to the Design of the Turbo-Compressor, M. Maekawa. Tohoku Imperial University—Technology Reports (Sendai, Japan), vol. 7, no. 2, 1928, pp. 1–44, 15 figs. Data for use in design of turbo-compressor; compression curves formulated: for uncooled case, for type with interstage-cooling; for type with jacket-cooling; for type with jacket-cooling, consisting of two casings and having intercooler between them; new proposal to determine diameter of each impeller so that stage efficiency remains constant throughout; hydraulic efficiency of each stage in multi-stage turbo-compressor.

Rotary. Planche System of Compressors and Vacuum Pumps with Rotary Pistons (Les compresseurs et pompes à vide à piston rotatif système Planche). Technique Moderne (Paris), vol. 20, no. 6, Mar. 15, 1928, pp. 237–239, 7 figs. Machine for compressing air which is turbo or electric driven and has no reciprocating parts; efficiency is as high as 96 per cent for large sizes.

AIRPLANE ENGINES

Oil Coolers. The Vickers-Potts Oil Cooler. Aeroplane (Lond.), vol. 34, no. 9, Feb. 29, 1928, p. 292, 2 figs. Standardized segmental oil cooler suitable for use with practically every type of airplane engine; cooling elements consist of hollow fins through which oil from engine passes on its return to oil tank; obstructions cause oil flow to be turbulent; cooling surface per fin; weights and horsepower absorbed in overcoming drag.

Specifications. Manufacturers' Specifications on Engines Available for Commercial Use as Compiled by Aviation. Aviation, vol. 24, no. 13, Mar. 26, 1928, p. 790. Table of manufacturers' specifications for airplane engines in commercial use.

AIRPLANES

Bernard-Hubert. Airplanes of the Future: Bernard-Hubert Airplane (Avions d'avenir, avion Bernard Hubert), J. A. Lefranc. Nature (Paris), no. 2780, Mar. 1, 1928, pp. 202–205, 6 figs. Description of single-engined monoplane with thick wooden wing similar to Fokker wing; fuselage entirely of wood; there are two passenger rooms, of which front compartment, with two seats, can be converted into baggage or mail room; rear compartment has 6 seats; method of testing wings with sand bags.

Flight Calculations. A Few More Mechanical-Flight Formulas Without the Aid of Polar Diagrams, M. Schrenk. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 457, Mar. 1928, 26 pp., 8 figs. on supp. plates. Investigation of relations in flight with best coefficient of glide; performance characteristics of airplane follow law independent of shape of airplane, when based on flight conditions at best glide coefficient; aerodynamically best possible or "ideal" airplane produced on this assumption; relations of airfoils. From 1927 Yearbook of Deutsche Versuchsanstalt fuer Luftfahrt.

Seaplanes. See SEAPLANES.

Slipstream Effect. Slip-Stream Effect, M. Watter. Aero Digest, vol. 12, no. 2, Feb. 1928, pp. 175–177 and 297–298, 8 figs. Data accounting for mutual interaction of propeller and objects in its slipstream; magnitude of its effect; problem of theoretical performance calculation; error in level flight analysis small; slipstream effect causes comparatively greater error in climb; propeller-slip effect; obstruction effect.

Stress Analysis. Stress Analysis of Commercial Aircraft, A. Klemin. Aviation, vol 24, nos. 11–14, Mar. 12–Apr. 2, 1928, pp. 632–633, and 654–660, 14 figs., 704–705 and 723–731, 17 figs., 774–775 and 794–799, 10 figs., and 838–839 and 848–853, 7 figs. Mar. 12: Fundamentals of stress analysis as applied to design of commercial airplanes; analytical and graphical methods of applying equations to determinate structures; approximate analysis of wing truss; method of joints; method of shears, method of moments. Mar. 19: Stress analysis of commercial aircraft; formula for stress due to bending; deflection; type of loading that actually occurs on airplane wing where inner support is pinned; computations for horizontal shear stresses. Mar. 26: Department of Commerce requirements; determining airworthiness of airplane; inverted flight; low and high incidence; level and 3-point landing; landing with side load; braked landing; stress-analyzing fuselage for air loads. Apr. 2: Stress analysis of commercial aircraft; choice of proper materials for structural parts of airplanes; reduction in allowable stress on wooden member subjected to combined bending and axial compression loads; joints; use of plywood.

AIRSHIPS

Semi-Rigid, England. A New Airship Scheme. Aeroplane (Lond.), vol. 34, no. 9, Feb. 29, 1928, p. 304. Scheme for design of new kind of airship of semi-rigid type; 1,000,000 cu. ft. capacity, giving gross lift of 30 tons; relatively low fineness ratio; five engines total 1500 hp.; keep is double; position of engine units; metal plating for everything; application of metal coating to fabric may have uses.

ALLOY STEELS

Locomotive Forgings. Locomotive Forging Steels, O. V. Greene. Am. Soc. Steel Treating—Trans., vol. 13, no. 4, Apr. 1928, pp. 573–588 and (discussion) 588–602, 18 figs. Results of tests made on various types of heat-treated alloy steels for reciprocating locomotive parts; many railroads are using normalized steel for their forgings; normalized forging steel tends to eliminate internal fissures and cracks, internal strains, ferritic segregation due to non-metallic impurities; if weight is important factor, however, such steels as vanadium or manganese are used so that sections may be safely reduced in size.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bronze. See BRONZE.

Cast, Shrinkage of. Minute Shrinkage Cavities in Some Cast Alloys of Heterogeneous Structure, W. A. Cowan. Inst. of Metals—advance paper, no. 451, for mtg., Mar. 8–9, 1928, 6 pp., 7 figs. Cavities in certain heterogeneous alloys are described as due to shrinkage, accompanying change in volume between liquid and solid phases, of relatively low freezing-point component, where it last freezes after bulk of alloy has solidified at higher temperature; tin-base alloys are shown to contain minute shrinkage cavities when small percentages of lead are present but to be practically free from similar cavities with no lead content.

Copper. See COPPER ALLOYS.

Equilibrium Diagrams. Equilibrium Diagrams, W. Rosenhain. Foundry Trade Jl. (Lond.), vol. 38, no. 603, Mar. 8, 1928, pp. 169–173. Explanation of equilibrium diagrams; simple and duplex alloys; nature of micro-constituents; transitional phases; maintaining condition of balance between solid and liquid; principle of phase rule; energy potential and metastable alloys; thermal analysis; dilatometry; alloying and its results; age hardening; equilibrium and future developments. Presidential address to Inst. of Metals. See also Metal

Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Industry (Lond.), vol. 32, nos. 10 and 11, Mar. 9 and 16, 1928, pp. 259–261 and 275–277.

ALUMINUM ALLOYS

Egalite. Specially Processed Aluminum Alloy Marketed as "Egalite," P. M. Heldt. Automotive Industries, vol. 58, no. 10, Mar. 10, 1928, pp. 416–417. Alloy has been subjected to special process while in molten state; process said to give greater degree of uniformity of molecular structure and to increase tensile strength and elongation; process applicable to wide variety of compositions; recommended for casting cylinder heads; reduces maximum temperature; results of tests on engines with cast-iron and Egalite metal heads; effect of process explained.

AUTOMOBILE ENGINES

Crankshafts, Machining. An Unusual Crankshaft and How It Is Made, J. A. Lucas. Am. Mach., vol. 68, no. 11, Mar. 15, 1928, pp. 445–450, 33 figs. Methods of machining unusual crankshaft from solid forging of chrome-nickel steel in Lancia plant; construction of crankshaft made necessary by staggered cylinders; method of feeding crankshaft through spindle; special fixture used in grinding crankpins so as to index them to match angularity of cylinders; various gages for inspection of shaft.

Design. Automotive Fuels and Engines (Brennstoffe und Motoren fuer Kraftwagen), A. Heller. V.D.I. Zeit. (Berlin), vol. 72, no. 10, Mar. 10, 1928, pp. 335–340, 13 figs. Development of gasoline substitutes; cracking process; antiknock fuels; selection of dimensions and number of cylinders of automotive engines; simplified construction; Rushmore method of cooling by steam condensation; electric equipment of automotive vehicles.

Detonation. Mechanical Design in Relation to Detonation, H. R. Ricardo. Instn. Petroleum Technologists—Jl. (Lond.), vol. 14, no. 66, Feb. 1928, pp. 2–10 and (discussion) 10–26. It will not pay, at all events for automobile engines, to employ higher compression when to do so necessitates adding any extra weight to reciprocating parts; turbulence; effect of cylinder size on detonation.

Differential-Stroke (Andreau). The Kinematics of the Andreau Differential-Stroke Engine, S. J. Davies. Engineering (Lond.), vol. 125, no. 3243, Mar. 9, 1928, p. 277, 4 figs. This engine of Citroën Gear Co., working on Atkinson cycle, gives extraordinarily low gasoline consumption of 0.379 lb. per b.hp. per hr., equivalent to overall or brake thermal efficiency of about 36 per cent; investigation into kinematics of type of mechanism used in engine; includes curves showing displacement, velocity and acceleration.

Gasoline, Detonation of. Results of Two Detonation Surveys, H. K. Cummings. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, pp. 448–457, 7 figs. First is survey of current methods of measuring anti-detonation qualities of motor fuels; second is survey of relative detonation characteristics of available fuels as determined by routine method of fuel testing now employed by Bureau of Standards; comparative data on apparatus and methods presented in tabulation which includes 20 laboratories; knock ratings for British and American gasolines.

Oil Cooling. Cooling the Oil, W. F. Bradley. Autocar (Lond.), vol. 60, no. 1689, Mar. 16, 1928, pp. 485–486, 2 figs. Method of isolating and cooling oil undoubtedly results in economy; experience gained in racing; latest model 6-cylinder Peugeot Knight engine has oil radiator combined with and forming lower portion of water radiator; system of oil cooling on latest 6-cylinder Rochet Schneider.

Superchargers. Supercharged Motor-Vehicles, D. Gregg and L. Schweitzer. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, pp. 486–487. Review of Indiana Section meeting with brief abstracts of papers; practicability and advantages of supercharger installation; performance of supercharged car; two methods of supercharging engine were tested; supercharging heavy vehicles; special engine-design possibility.

AUTOMOBILE PLANTS

Humber (England). The Works of Humber, Ltd. Automobile Engr. (Lond.), vol. 18, no. 239, Mar. 1928, pp. 83–88, 11 figs. Plant and manufacturing methods used in automobile section of Humber factory; complete production with few exceptions; iron, yellow metal, and aluminum casting undertaken with some die castings; automobile work separated from cycle and motorcycle manufacture; iron foundry; smithy; press; and hardening shops; operations in machine shop; chassis erecting and paint shops.

Maintenance Department (Ford). Maintenance Practices at the Fordson Plant, F. L. Faurote. Indus. Eng., vol. 86, no. 3, Mar. 1928, pp. 106–110 and 149, 9 figs. Work of maintenance department at Fordson plant, and manner in which it is planned and carried out; rough or semi-finished sketches sufficient; skilled workers; fabricating shop and equipment; small maintenance departments; installations of balconies and conveyors; steam fitting; reclamation of material from government ships; care of electric motors.

AUTOMOBILES

Bodies, Design of. Body Design, O. T. Kreusser. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, pp. 409–410. Discusses following question: Do 1928 bodies meet requirements of public from practical viewpoint as determined by man who tests them? good appearance first requirement of car; some uniformity should be reached in dimensions; criticisms of body hardware; squeaks; safety bodies. Abstract of paper read before Body Division of Detroit Section.

Chassis, Welding vs. Riveting. Riveted or Welded Automobile Chassis Frames (Genietete oder geschweisste Kraftwagenrahmen), H. Splinder. Motorwagen (Berlin), vol. 31, no. 6, Feb. 29, 1928, pp. 102–105, 6 figs. Reports tests by author on relative strength of welded and riveted joints of channel beams; results indicate superiority of welded joints.

Design. America's Future Passenger-Car, T. J. Little. Soc. Automotive Engrs.—Jl. vol. 22, no. 4, Apr. 1928, pp. 487–488. Trend of development of American motor car; many epoch-making inventions will be made; virtually all automobile engines of future will have superchargers built directly into them; four-cylinder engine to be superseded by eight-in-line engine operated at higher speed; power brakes; many small new companies to be formed. Abstract of paper read before Dayton section with brief discussion.

Front-End Drive. The Voran Front End Drive. Automotive Abstracts, vol. 6, no. 3, Mar. 20, 1928, p. 81. Description of front end; mechanism is characterized as one of best solutions of problem; drive has independent wheel action with two parallel transverse springs above one another and drive axles with three universal joints. Brief abstract translated from Omnia, Jan. 1928.

Springs and Suspension. The Lancia Floating Front-Wheel Suspension, J. A. Lucas. Am. Mach., vol. 68, no. 13, Mar. 29, 1928, pp. 531–533, 7 figs. Construction of very unusual suspension and method of making springs and recoil mechanism; each front wheel has its own coil spring and shock absorber that resembles recoil mechanism, or recuperator, for which French 75-mm. guns were famous; tests of springs; method of testing piston mechanism; spring-winding machine.

Steering Gears. Automobile Steering Gear, Problems and Mechanism, F. W. Lancaster. Automobile Engr. (Lond.), vol. 18, no. 239, Mar. 1928, pp. 102–106 and (Appendix by R. H. Pearsall) 106–108, 12 figs. Difficulties that have arisen in connection with steering mechanism; high-speed shimmy and low-speed shimmy; tramp is alternate rising and falling of steering road wheels; source of energy; problems of damping; Lanchester shimmy damper; interpretation of equations; elastic drag link.

B

BAKELITE

Machining. Bakelite and How It Is Machined, P. Hagen. Machy. (N. Y.), vol. 34, no. 8, Apr. 1928, pp. 622–623. Properties of bakelite; machining operation; method of turning; practice in drilling; sawing and punching bakelite; threading and milling; polishing.

BALANCING

Rotors. The Static Balancing of Rotors, B. P. Haigh. Engineer (Lond.), vol. 145, no. 3767, Mar. 23, 1928, pp. 310–312, 7 figs. In different works, engaged in construction of different kinds of machinery, widely different methods of balancing have been developed with success; author indicates why such different methods are preferred in different circumstances, and contrasts advantages of static and dynamic balancing; whole idea of external balance is based on hypothesis that rotor may be regarded as rigid body incapable of flexure; distinctions between different types of unbalance.

BEARINGS, BALL

Standardization. Ball-Bearing Standardization. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, pp. 481–483, 1 fig. Proposals for uniform worldwide standards for ball bearings discussed at International Conference on Ball Bearing Standardization; international uniformity of annular type nearly attained; others being considered; near agreement on metric thrust-bearing tables; gaging; tolerances; tolerances on widths; eccentricity; inch-dimension bearings; corner radii; roller bearings; adapter-sleeve bearings.

BEARINGS, ROLLER

Utilization by Railroads. Roller Bearings for Railway Equipment, W. C. Sanders. Ry. Club of Pittsburgh—Proc., vol. 27, no. 4, Feb. 23, 1928, pp. 81–92 and (discussion) 93–101, 12 figs. Tapered roller-bearing principle; adjustibility of tapered bearing; bearing for passenger-car equipment; roller bearings for freight equipment; economic advantages to be gained by universal adoption of roller bearings for use on railroad cars are of many different kinds; more important are summarized.

BOILER FEEDWATER

Softening. Lime and Soda Treatment of Feed Water, E. M. Partridge. Power, vol. 67, no. 12, Mar. 20, 1928, pp. 507–509. Result obtained by lime-soda softeners on division of Mid-Western railway; accompanying tables of analyses support statement that water may be made actually more corrosive in character by partial softening with lime and soda and that lime-soda softening does not insure formation of soft sludge in boiler unless treatment be complete.

BOILER FURNACES

Pulverized-Coal. A Million Pound Boiler. Elec. Times, vol. 73, no. 1892, Jan. 26, 1928, p. 125, 2 figs. Details of Rileyturba firing system on twin boiler; 100,000 kw-hr. capacity is secured by burning 50 tons of average-quality coal hourly in two water-walled furnaces; gives graphic comparison of storage or indirect system of pulverized-coal firing with direct-firing system developed by C. Erith.

BOILER PLATE

Embrittlement. Embrittlement of Boiler Plate, S. W. Parr and G. F. Straub. Power Plant Eng., vol. 32, no. 7, Apr. 1, 1928, pp. 414–417. Causes and descriptions of cracks due to embrittlement and methods of inhibition; material has not been found to be at fault; design of boiler is not primary cause; operation is not to blame; sodium hydroxide is only material encountered in boiler which embrittles stressed steel; increased sulphate has been effective in stopping this trouble; new inhibiting agents have been developed. Abstract of paper presented at Midwest Power Conference.

Nickel-Steel. Alloy Steel for Boiler Construction, C. McKnight. Am. Soc. Steel Treating—Trans., vol. 13, no. 4, Apr. 1928, pp. 638–657 and (discussion) 657–658, 10 figs. As material for boiler construction nickel steel offers following advantages: it is between 25 and 40 per cent stronger than carbon steel with practically same toughness and greater resistance to impact; at boiler temperatures it is much superior to carbon steel; it is immune to aging embrittlement; it can be made to develop even higher strengths than are now demanded; it is resistant to boiler corrosion; it is suited for use as boiler tubes and staybolts. Bibliography.

BOILERS

Design. Boiler for Rapid Steam Raising. Engineering (Lond.), vol. 125 no. 3243, Mar. 9, 1928, p. 303, 1 fig. New model of their "Express" boiler introduced by R. H. Bolsover, of Eaglescliffe. Durham; used for applications in which portable rapid-steaming generator of superheated steam is necessary.

Heat Transmission in. Heat Transmission in Modern Boilers, Roszak and Veron. Power Engr. (Lond.), vol. 23, no. 265, Apr. 1928, p. 152. Discusses factors influencing heat transmission with special reference to their bearing on design of modern boilers and possibilities of further improvements; methods of increasing heat transfer by radiation and convection; typical data concerning heat absorption per unit area of heating surface under different conditions. Abstract translated from Société des Ingénieurs Civils.

Marine, Pulverized-Coal. Test of Pulverized Coal as Applied to Scotch Marine Boilers, C. E. Jefferson and J. S. Evans. Mar. Engr. and Motorship Bldr. (Lond.), vol. 51, no. 607, Mar. 1928, pp. 101–102, 1 fig. Report of 240-hr. test of system finally developed and installed in 9700-ton freighter "Mercer," in order to determine by actual operation real merits of pulverized fuel when applied to existing types of cargo vessels fitted with Scotch boilers.

Steam-Heating. Relation Between Output and Operating Characteristics of Low-Pressure Steam-Heating Boilers, P. Nicholls. Am. Soc. Heat. and Vent. Engrs.—Jl., vol. 34, no. 3, Mar. 1928, pp. 175–188, 7 figs. Discusses relations which exist between some of the operating characteristics of low-pressure steam-heating boilers, and gives results of tests.

Water-Tube. Data Concerning High-Power Water-Tube Boilers (Grossheizflaechen-Steilrohrkesselanlagen), H. F. Lichte. Waerme (Berlin), vol. 51, no. 6, Feb. 11, 1928, pp. 103–105, 3 figs. Describes Humboldt vertical-tube boilers with heating surfaces from 10,800 to 21,600 sq. ft.; it is claimed that these boilers are economical in capital and operating costs, relatively simple in equipment, and easily supervised; two boilers in Kupferdreh electricity works have chain-grate stokers to carry basic load and pulverized-fuel burners to deal with peak loads. Brief translated abstract in Power Engr. (Lond.), vol. 23, no. 265, Apr. 1928, p. 152.

BRONZE

Gear. Developments in Gear Bronze, T. H. W. Jeacock. Can. Foundryman (Toronto), vol. 19, no. 3, Mar. 1928, pp. 30–31. Best bronze worm-gear blanks made with nickel content by process known as three-sided chill; inclusion of nickel in bronze alloy for gear blanks increases yield point considerably with but slight loss in elongation; outstanding advantages gained by inclusion of nickel are decreased pitting of wheel-teeth surface, increased wearing quality, lower operating temperatures.

C

CABLES, HOISTING

Stresses in. Hoisting Cables, Stresses and Tests (Ansprueche an Foerderseile und ihre Pruefung), H. Herbst. V.D.I. Zeit. (Berlin), vol. 72, no. 10, Mar. 10, 1928, pp. 345–349, 10 figs. Great importance of effect of dynamic stresses, such as jerks and vibrations, at clip points of wire rope attachments; fatigue failures; desirability of large-diameter wires; rust protection by galvanization; standard tension, flexure and torsion tests; necessity of constant careful inspection.

CAST IRON

Properties. Mechanical and Physical Properties of High-Grade Gray Cast Iron and Principles Underlying Its Production (Hochwertiger Grauguss, seine mechan.-physikal. Eigenschaften und die Grundlagen zu seiner Erzeugung), E. Zimmermann. Zeit. fuer die gesamte Giessereipraxis (Berlin), vol. 49, nos. 7, 8, 9 and 10, Feb. 12, 19, 26 and Mar. 4, 1928, pp. 64–65, 71–72, 78–80 and 91–93. Feb. 12: Structural constituents of alloys from 0 to 1.76 per cent Feb. 19: Distribution of constituents in white and gray cast iron after solidification. Feb. 26: Iron-carbide system and iron-graphite system. Mar. 4: Lanz pearlitic cast iron. Mar. 11: Graphite eutectoid. Mar. 18: Cast iron according to Thyssen-Emmel process.

COMBUSTION

Control. Automatic Combustion Control. Sci. Instruments—Jl. (Lond.), vol. 5, no. 1, Jan. 1928, pp. 17–19, 5 figs. Instruments employed to control stokers, dampers, and fans to obtain automatic operation of furnaces; four controllers, one actuated by steam pressure, and other three controlling fuel feed, air flow and furnace pressure, respectively; master controller consists of pressure gage with spring and weight control and contact arm with variable lever ratio moving over contacts of rheostat; three other controllers consist of differential pressure balances.

COMPRESSED AIR

Utilization in Manufacturing Plants. Pneumatic Machine Tools and Equipment for Manufacturing Plants (Pressluftwerkzeugmaschine und Pressluftvorrichtung in der Fertigung), K. Bollinger. Maschinenbau (Berlin), vol. 7, no. 5, Mar. 1, 1928, pp. 215–218, 9 figs. Historical sketch of pneumatic operation methods in Germany and other countries; control of air-compressor plants by "lumographs" and other apparatus; graphs of running time of air compressors in manufacturing plants, air-compressor fittings; possible applications of compressed air in woodworking, especially piano manufacture.

CONDENSERS, STEAM

Heat Transmission in. Heat Transfer in Condensers, S. B. Jackson. Elec. Times (Lond.), vol. 73, no. 1897, Mar. 1, 1928, pp. 326–327, 1 fig. Determination of heat-transmission coefficient between steam and circulating water in design of turbo-alternator condensers; resistance of metal; the higher the coefficient of heat transmission which tube is designed for, the greater will be effect of heat-resisting material which may become deposited on tubes.

CONVEYORS

Pneumatic, for Wood Shavings. Design of Exhausters for Pneumatic Wood-Shavings Conveyors (Berechnung des Exhaustors einer Spaeneabsaugeanlage), S. Grakhan. Foerdertechnik u. Frachtverkehr (Wittenberg), vol. 21, no. 3, Feb. 3, 1928, pp. 67–70, 3 figs. Analysis of conditions, design formulas, numerical example.

Maintenance and Repairs. Materials Handling Equipment, E. J. Tournier. Indus. Eng., vol. 86, no. 3, Mar. 1928, pp. 141–143, 5 figs. Elements that make up conveyor system require same consideration of their mechanical well-being as do other tools; lubrication requires greatest attention from inspectors; chain-type conveyors; gravity roller conveyors; systematic inspection that reduces repairs; selection of equipment by engineering analysis.

COOLING TOWERS

Spray Type. Marley Unit Type Spray Cooling Tower. Power, vol. 67, no. 12, Mar. 20, 1928, p. 527, 1 fig. Particularly adapted to ice-plant, oil-engine and similar installations, where small quantities of water must be cooled continuously; brought out by Power Plant Equipment Co., of Kansas City, Mo.; spray equipment consists of four Marley cooling cones assembled upon special group fitting.

CONVEYORS

Freight-Car Loading. Conveyor Reduces Car-Loading Labor Costs One-Third, J. P. Simons. Mfg. Industries, vol. 15, no. 4, Apr. 1928, p. 309, 1 fig. One of problems of Saginaw Salt Products Co. is loading of package and bag salt into freight cars for carload shipment; labor is reduced one-third by conveyor system employing movable sections on castors, in some cases adjusted for height by means of auto jacks.

COPPER ALLOYS

Heat Treatment. On the Quenching and Tempering of Brass, Bronze, and "Aluminium-Bronze," T. Matsuda. Inst. of Metals—advance paper, no. 463, for mtg., Mar. 7–8, 1928, 42 pp., 20 figs. Effect of quenching and tempering on microstructure, electrical resistance, hardness, and other mechanical properties of brass, bronze, and "aluminum-bronze" was examined; it was confirmed that these copper alloys containing proper amount of second metals may be hardened by suitable heat treatment.

CRANES

Cargo. Cargo Cranes—Types Available, Factors Governing Selection, and Latest Developments, B. Dunell. Materials Handling (A.S.M.E. Trans.), vol. 50, no. 5, Jan.-Apr. 1928, 6 pp., 9 figs. Discusses types of cranes used on docks for removing cargoes from ships and placing articles handled, crates, barrels, bundles, etc., at points desired; disadvantage of ordinary luffing crane is that when jib is luffed in, load suspended from jib head is simultaneously raised, resulting in wasted work; describes level-luffing cranes which overcome this objectionable feature and permit more flexible operation.

D

DILATOMETERS

Rockwell. The Rockwell Dilatometer, with Panel Built into Instrument. Instruments, vol. 1, no. 3, Mar. 1928, p. 13, 1 fig. Panel board holds vibrator, light for automatically indicating critical range, bell for automatically indicating completion of critical range, and bell-ringing transformer for direct connection to 110- or 220-volt line; device is designed for any stationary furnace whose hearth is of ceramic material and rigid; instrument mounting for large furnaces.

DIES

Drawing, for Sheet Metal. Typical Drawing Dies for Sheet Metal. Am. Mach., vol. 68, nos. 13 and 14, Mar. 29 and Apr. 5, 1928, p. 549, 5 figs., and p. 589, 4 figs. Mar. 29: Five line drawings showing design of typical drawing dies; plain form of drawing die for part previously blanked; redrawing die for second operation on shells which cannot be completed in one draw; combination blanking and drawing die; double drawing die for irregular part; redrawing die for forming shells made of metal likely to wrinkle. Apr. 5: Line cuts of four dies with brief description of each; used mostly for odd-shaped work, or for drawing metal with low plasticity; simple combination blanking and drawing die; die that blanks and draws shell in one operation; combination drawing die that employs two pressure rings.

Producing Transformer Laminations. Machy. (Lond.), vol. 31, no 804, Mar. 8, 1928, pp. 734–735, 4 figs. Dieing machines used in place of hand-fed machines to increase production 169 per cent; life of dies was increased 59.1 per cent; machines are equipped with double roll automatic feed; simple square-cornered transformer laminations are made; no lubricant required.

DIESEL ENGINES

Automotive (German). Modern Automotive Diesel Engines (Der Huetige Fahrzeugdiesel), E. Aster. Allgemeine Automobil-Zeitung (Berlin), vol. 29, no. 10, Mar. 10, 1928, pp. 29–31, 7 figs. Details of automotive Diesel engines by M.A.N. Junkers (45 hp.), Maybach (150-hp., six cylinder), Mercedes-Benz, etc.

Experimental. A Note on Experimental Diesel Engines, A. Turner. Engineer (Lond.), vol. 145, no. 3769, Apr. 6, 1928, pp. 383–385, 2 figs. Recent developments at Admiralty Engineering Laboratory; study on general behavior and characteristics of engines of different types; experimental results show that opposed-piston type of engine develops most power for cylinder of given diameter and stroke; combustion processes are carried out much more readily in four-stroke than in two-stroke engines. Abstract of paper presented to Instn. Naval Architects.

Fuels. Diesel-Engine Performance on Oils Obtained from Low-Temperature Carbonization of Coal, J. S. Brown. Roy. Tech. Soc.—Jl., no. 4, Dec. 1927, pp. 76–84, 1 fig. Also Engineer (Lond.), vol. 145, no. 3765, Mar. 9, 1928, p. 274. Discusses important aspect in ultimate value of oils now being obtained by subjecting coal to low-temperature carbonization treatment; tests on Diesel engine are quoted to show difference in behavior of these oils as compared with petroleum fuel oil; oils are definitely preferable to creosote oils previously obtained from coal.

Supercharging. Proposed Method of Supercharging Diesel Engines. Mar. Engr. and Motorship Bldr. (Lond.), vol. 51, no. 607, Mar. 1928, pp. 103–104, 1 fig. Method of supercharging is examined in order to show how it meets conditions laid down, viz., no increase in compression pressure, reduction in compression and combustion temperatures and jacket losses, with increase in thermal efficiency, while at same time increasing indicated mean pressure.

E

ECONOMIZERS

Efficiency. Economizers, W. F. Keenan, Jr. Engrs.' Soc. West. Pa.—Proc., vol. 43, no. 8, Nov. 1927, pp. 368–383 and (discussion) 383–388, 7 figs. Unit steel tube with extended surface is most modern type of economizer; important design requirements for this type of economizer are discussed; unit setting; design of casing; extended surface; typical examples of comparative air-heater and economizer performances.

ELECTRIC LOCOMOTIVES

Combined Battery and Trolley. Dual Electric Locomotives on "North Shore" Line. Ry. Age, vol. 84, no. 12, Mar. 24, 1928, p. 668, 1 fig. Trolley is used on main line and all other trackage where overhead power connections are afforded; storage battery used for moving freight on industrial sidings and switch tracks without trolley connections; locomotive weighs 65 tons; equipped with four 205-hp. motors and battery of 192 cells, rated 600 amp-hp. and capable of delivering 260 kw-hr. on one charge.

North Shore Line Uses Combination Trolley and Battery Locomotives, F. H. Brehob. Elec. Ry. Jl., vol. 71, no. 10, Mar. 10, 1928, pp. 393–394, 1 fig. Locomotive designed to operate from either trolley or storage-battery power, which will automatically recharge storage batteries when power is supplied by trolley; put in service by Chicago, North Shore and Milwaukee R.R.; equipment includes four 200-hp. motors and 192-cell storage battery; transfer from trolley to battery power made automatically by relay which actuates transfer contactors. See also description in Ry. & Locomotive Eng., vol. 41, no. 1, Jan. 1928, pp. 14–15.

Single-Phase. The Single-Phase Express Locomotive Type 2 D 1 with Brown Boveri Individual Axle Drive, W. Luethi. Brown

Boveri Rev. (Baden), vol. 15, no. 3, Mar. 1928, pp. 113–118, 9 figs. Design and construction of locomotive with individual axle drive; reversers of very simple design, each mounted directly on motor which it controls; wiring of high-tension circuit; electric-pneumatic control system for bow collectors; auxiliary circuits; generator for lighting and control circuits; diagram of driving cab; fan sets.

Three-Voltage. Electric Locomotives for Sacramento Northern, Operating on Three Voltages. Railroad Herald, vol. 32, no. 4, Mar. 1928, pp. 28–29. Unusual feature will enable them to be used on present system where power is collected from either 1200-volt overhead or 600-volt third rail and on extension of system which is underway where 1500-volt trolley will be used; explains operation of change-over equipment; mechanical parts are described and dimensions given.

ELECTRIC FURNACES

Annealing. Annealing of Non-Ferrous Metals in the Electric Furnace, R. M. Keeney. Am. Electrochem. Soc.—advance paper, no. 8, for mtg. Apr. 26–28, 1928, pp. 59–68. For this class of work electric furnace has proved more economical than oil or gas, in many cases resulting in annual return of 50 per cent on investment; in rolling mill, however, little progress has been made, although cost of electric annealing on heat basis only compares favorably with cost of oil annealing.

Carburizing. Large Carburizing Furnace Secures Recuperative Economies, W. J. Diederichs. Elec. World, vol. 91, no. 13, Mar. 31, 1928, pp. 667–668, 1 fig. Single-end, box-type furnace and recuperating chamber, both of special design, have been combined as unit for carburizing and normalizing of machine-tool parts with notable operating economies; furnace has electrical input of 81 kw. for operation on 220-volt, 3-phase power supply.

Iron-Founding. Electric Furnace Iron. Iron Age, vol. 121, no. 14, Apr. 5, 1928, p. 955. Results of extended experiments show practicability, advantages and costs; electric furnace used in conjunction with cupola; possibility of producing electric furnace cast iron from cheap grades of ferrous scrap; one electric furnace can be used to produce both iron and steel; electric iron stronger.

ELECTRIC WELDING

Joint Testing. Static and Impact Tests of Electrically Welded Joints, R. J. Roark. Amer. Welding Society—Jl., vol. 7, no. 2, Feb. 1928, pp. 57–64, 9 figs. Tests were intended to form part of more extensive study of structural welding; results of these tests are presented, in condensed form; purpose and method of testing; results.

Progress in. Progress in Electric Welding Practice (Fortschritte im elektrischen Schweissen). Elektrotechnische Zeit. (Berlin), vol. 49, no. 10, Mar. 8, 1928, pp. 381–382. Reviews recent progress in construction of spot, seam and butt-welding outfits; electric arc welding and its applications.

Spot. Spot Welding of Aluminum and Its Alloys, W. M. Dunlap. Am. Welding Soc.—Jl., vol 7, no. 2, Feb. 1928, pp. 27–38, 7 figs. Spot-welding aluminum has been quite extensively studied in laboratories of Aluminum Co. of America; results obtained, all of which have been put to practical use, have been reviewed and collected; paper embraces major results of study and includes specific recommendations in regard to proper practice to be followed in spot welding of aluminum.

F

FACTORIES

Layout for Cutting Handling Costs. Importance of Factory Lay-Out in Cutting Handling Costs, A. Caddie. Can. Machy. (Toronto), vol. 39, no. 5, Mar. 8, 1928, pp. 38, 40 and 42, 5 figs. Method of reducing distance between operations and placing operations in their proper sequences; planning for probable expansion in future; considerable amount of data secured before commencing actual work; laying out on blue print tentative routings following shortest practical routes; cardboard templates of all machinery, benches and fixtures cut to scale of blue print and placed in position; avoiding rehandling.

FLOW OF STEAM

Orifices. Measuring Steam Flow in Pipes by Means of Ring Diaphragms (Beitrag zur Mengenmessung stroemenden Dampfes mittels Stauringen), W. Pflaum. Forschungsargeiten auf dem Gebiete des Ingenieurwesens (Berlin), no. 298, 1928, 41 pp., 59 figs. Report from mechanical laboratory of Danzig Institute of Technology on experiments for determination of discharge coefficient of steam flowing through orifices of pipe diaphragms, using ethylene bromide as pressure-indicating liquid and employing pressures from 3 to 11 atmos.; compares with results of earlier experimenters, including Brandis, Spitzglass, Reschke, etc.

FLOW OF WATER

Turbulent Calculation. Development of Vector Integrators for the Mechanical Solution of Problems of Potential and Turbulent Flow (Die Entwicklung der "Vektorintegratoren" zur maschinellen Loesung von Potential- und Wirbelproblemen), H. Foettinger. Zeit. fuer Technische Physik, vol. 9, no. 1, 1928, pp. 26–39, 21 figs. Report from Charlottenburg institute for experimental study of flow phenomena and flow machines; underlying mathematical and kinematical principles, locus functions: construction of integrating instruments, methods of use and practical applications to study of hydraulic machines.

Weirs. Precise Weir Measurements, W. S. Pardoe. Am. Soc. Civ. Engrs.—Proc., vol. 54, no. 4, Apr. 1928, pp. 1157–1163, 6 figs. Discussion of paper by E. W. Schoder and K. B. Turner continued from Mar. 1928 issue of Proceedings; coefficient curves of experiments made in Hydraulic Laboratory of Civ. Eng. Dept. of University of Pennsylvania; work was done for Water Supply Commission of State of Pennsylvania; this type of weir is being used by State for gaging streams, low flows being confined to small weir and higher flows passing over two crests.

FORGING

Behavior of Metal. The Behaviour of Metals and Alloys During Hot-Forging, W. L. Kent. Inst. of Metals—advance paper, no. 462, for mtg., Mar. 7–8, 1928, 18 pp., 6 figs. Also Engineering (Lond.), vol. 125, no. 3244, Mar. 16, 1928, pp. 331–333, 6 figs. Cylindrical specimens of pure metals and some brasses were forged with standard blow of 50 ft-lb. at temperatures up to melting points, and mechanism of hot forging was investigated by measurements of degree of compressions produced and by comparison of Brinell hardness values so obtained; although forging test does not measure malleability of metal or alloy, it will indicate relative forgeability at different temperatures, and also liability for cracking to occur during operation.

FOUNDRIES

Materials Handling in. Hauls Foundry Materials on Electric Trucks. Foundry, vol. 56, no. 6, Mar. 15, 1928, pp. 222–225, 8 figs. Use of industrial electric trucks in malleable and gray-iron foundry; direct saving made by each lift truck; trucks in gray-iron shop; battery-driven rail cars equipped with two platforms scales in tandem; trucks carry cupola charge; handling cores. Abstract of publication. "Profitable Application of Electric Industrial Trucks and Tractors in Industry," of Soc. Elec. Development.

FURNACES

Electric. See ELECTRIC FURNACES.

Heat-Treating. Automatic Furnaces for Annealing and Heat-Treating. Am. Mach., vol. 68, no. 12, Mar. 22, 1928, p. 492, 4 figs. Four halftones furnished by Warner Gear Co.: conveyor so timed as to maintain proper heat; hump furnaces are used in heat-treating gears; each halftone is accompanied by brief description.

Forging and Heat Treating of Long Cylinders, J. B. Nealey. Iron Age, vol. 121, no. 14, Apr. 5, 1928, p. 942, 2 figs. Special equipment installed at Miehle Printing Press & Mfg. Co.; vertical furnace to case-harden rollers and shafts; parts lowered into vertical retorts charged with small amount of carbonizing material; three-high furnace; upper chamber gets first impact of gas flame, and waste heat from it is passed down into other two; two helve hammers are used for swaging ends on press rollers.

Spring Heat Treating Furnaces Automatically Controlled, F. Stones. Fuels and Furnaces, vol. 6, no. 3, Mar. 1928, pp. 373–376, 6 figs. Automobile spring heat-treating unit consists of hardening and tempering furnaces which are fired with oil and have temperatures automatically controlled; cambering and hardening furnace of continuous type; hardening furnace of over-fired type; drawing furnace; tempering furnace of continuous type; each of the furnaces is equipped with two controlling pyrometers and valves.

G

GAGES

Dial Indicating. Dial Indicating Gages. Iron Age, vol. 121, no. 13, Mar. 29, 1928, pp. 880–881 and 917, 5 figs. Devices designated as Mikrotasts for shop and inspection use show variations up to 0.00004 in. from master; used for measuring external and internal diameters and tapers; used for thread gaging; saddle gages for checking rolls; gages can be used on wet grinding operations; external taper gaging; checking internal tapers; pitch and root diameters of external threads checked; brought out by F. Krupp Corp., Germany.

Optical, for Crankshafts. A Mechanical and Optical Gaging Apparatus for Grinding of Electric Locomotive Crankshafts (Mechanisch-optische Messvorrichtung an einer Kurbelwellenschleifmaschine fuer elektrische Lokomotiven), B. Wachsmuth. Elektrische Bahnen (Charlottenburg), vol. 4, no. 1, Jan. 15, 1928, pp. 7–12, 11 figs. Details of V-plate micrometer gage developed by Carl Zeiss of Jena to be used in connection with large crankpin grinding machine and lathe.

GAS TANKS

Arc Welding. All-Welded Gas Holder Takes 258 Tons of Plates and Shapes, F. H. Beebe. Iron Age, vol. 121, no. 14, Apr. 5, 1928, pp. 941–942, 2 figs. Gas holder of 300,000-cu. ft. capacity, erected at Albion, Mich., believed to be largest all-welded low-pressure gas holder built; plates are erected with narrow overlap and held with bolts at wide spacing until welder completes seam; 4 tons of welding rod used; cups and grips were fabricated in shop, assembled in sections on ground and welded in place.

GASOLINE ENGINES

Lubrication. Petrol Engine Lubricants and Lubrication, C. I. Kelly. Instn. Petroleum Technologists—Jl. (Lond.), vol. 14, no. 66, Feb. 1928, pp. 115–132, 8 figs. There are two types of lubrication, boundary and fluid lubrication; temperature-friction curves for cylindrical bearing; most suitable oil crankcase work is one having best viscosity ratio, low carbon-forming tendencies, coupled with comparative freedom from sulphur and minimum susceptibility to oxidation.

GEARS

Involute, Tooth-Thickness Measurement. Measurement of the Thickness of Involute Gear Teeth, A. H. Candee. Am. Mach., vol. 68, nos. 11 and 14, Mar. 15 and Apr. 5, 1928, pp. 463–467, 7 figs., and 573–576, 2 figs. Mar. 15: Calculations for pin measurement of gear teeth with standard pin sizes; simplification of calculations by means of standard tables for both external and internal gears; center of pin generally will not come on pitch circle; for given pitch and number of teeth dimensions between centers of diametrically opposite pins will vary with tooth thickness and pressure angle. Apr. 5: Development of formulas for measuring thickness of helical gear teeth by standard pin method and their application to typical case; in case of odd number of teeth certain advantage is lost because two pins cannot be placed symmetrically opposite each other; importance of correct tooth form.

Maag. Maag Gearing—Methods of Manufacture and Some Typical Applications. Shipbldr. (Lond.), vol. 35, no. 212, Apr. 1928, pp. 225–230, 16 figs. This type of gearing has been specially favored in connection with single-reduction geared steam turbines; H.M.S. Hood with propelling machinery of 140,000 s.hp. is outstanding example; Maag Gear-Wheel Co., of Zurich have developed methods of production by means of which highest degree of accuracy is attained which provides tooth form giving very favorable conditions of sliding contact during engagement; Maag gear-generating machine for spur gears up to 6 ft. 5 in.

Sheet-Metal, Pressed. Production of Gears, Segments and Sprockets from Sheet Metal. Am. Mach., vol. 68, no. 14, Apr. 5, 1928, pp. 559–562, 6 figs. Gears made in pressed tools and types of dies employed; sheet-metal gears cannot be used when transmission of much power is necessary; selection of materials; limitations of sheet-metal gears; broaching internal-gear dies; producing segment gear; type-wheel segments have their teeth formed in three dies; shaving teeth handled in die; inspection gages for punched gears.

GRINDING MACHINES

Surface. A New Heavy Surface Grinding Machine (Eine neue schwere Flaechenschleifmaschine), C. Krug. Maschinenbau (Berlin), vol. 7, no. 5, Mar. 1, 1928, pp. 224–226, 9 figs.

Horizontal-shaft and vertical-shaft types of grinding machines; construction, drawings and description of new vertical-shaft grinding machine constructed by Diskus-Werke of Frankfurt; its outstanding features.

H

HACK SAWS

High-Speed-Steel. Development of High Speed Steel Hack Saws or Cutting Off Saws, H. B. Allen. Am. Soc. Steel Treating—Trans., vol. 13, no. 4, Apr. 1928, pp. 603–613 and (discussion) 613–616 and 637, 1 fig. Discusses application of high-speed steel to machine hack-saw blades; steel is shown to be plastic for some time after hardening, even when it is above hardness of 62-C Rockwell; neither does it attain full hardness for considerable time after becoming quite cold; relative performance of saws made of high-speed steel and low-tungsten steel is also shown.

HEAT TRANSMISSION

Solid to Fluid. Heat Transfer from a Hot Body Immersed in a Fluid in Motion (Waermeabgabe eines heissen Koerpers in bewegter Fluessigkeit), J. Schmekel. Zeit. fuer technische Physik (Leipzig), vol. 9, no. 2, 1928, pp. 49–57, 3 figs. Derives formula expressing effect of free cooling upon forced cooling; formula is confirmed by experiments; discrepancies between experiment and theory are accounted for by hydrodynamic factors.

Theory. Heat Transfer (Waermeuebertragung), M. Jakob. V.D.I. Zeit. (Berlin), vol. 72, no. 10, Mar. 10, 1928, pp. 341–344, 1 fig. Review of theories and experiments on heat transfer by natural convection, with and without change of state, also by conduction and radiation; heat-radiation spectra; brief mention and abstracts of studies by leading German and non-German scientists.

Walls. Standard Test Code for Heat Transmission Through Walls, A. P. Kratz. Am. Soc. Heat. and Vent. Engrs.—Jl., vol. 34, no. 1, Jan. 1928, pp. 63–65. Code has been framed for purpose of defining certain standards, application of which, it is hoped, will bring results of different investigations into better conformity than is found at present time. See also discussion in no. 3, Mar. 1928, pp. 267–280.

HYDRAULIC TURBINES

Propeller-Type. Kaplan and Propeller Turbines (Kaplan- und Propellerturbinen), H. Pflieger-Haertel. Elektrotechnische Zeit. (Berlin), vol. 49, no. 12, Mar. 22, 1928, pp. 461–466, 20 figs. Features of Kaplan and propeller turbines compared; character of efficiency curves; overloads; bucket shapes; prevention of cavitation, design of inlet, turbine head, regulating devices, etc.; field of application; examples of existing installations. (To be concluded.)

The Turbines of the Lilla Edet Power Station on the Gota River (Turbinanleggene ved Lilla Edet kraftanlegg i Gotaelven), T. Gregersen. Teknisk Ukeblad (Oslo, Norway), vol. 75, no. 8, Feb. 24, 1928, pp. 77–80, 6 figs. Describes original alternative plans for Lilla Edet station; plan decided upon in 1917 called for 5 double turbines of 6600 hp. each, 68.3 r.p.m.; details of Kaplan 14,000-hp. propeller-type turbine.

Machinery. Large Hydraulic Turbine Work in a Canadian Shop. Am. Mach., vol. 68, no. 15, Apr. 12, 1928, pp. 616–617, 6 figs. Six halftones illustrating work that can be done only on machine tools of largest and heaviest class which must be sufficiently rigid to support heavy castings of large diameter; section of 41,000-hp. turbine casing being machined; boring stator ring; facing joint on half of cast-iron head cover; cast-iron turbine operating ring being machined; machining upper part of 193-in. Johnson valve; boring guide-valve holes in head cover.

Suction Head, Maximum. The Highest Permissible Suction Head in Hydraulic Turbines (Das hoechstzulaessige Sauggefaelle von Wasserturbinen), J. Ackeret. Schweizerische Bauzeitung (Zurich), vol. 91, no. 11, Mar. 17, 1928, pp. 135–136, 2 figs. Theoretical discussion calling attention to so-called dynamic suction head, which is important factor in design of Kaplan and propeller turbines and in prevention of cavitation.

I

ICE PLANTS

Economical. Making a Ton of Ice with 21 Kilowatt-Hours. Power, vol. 67, no. 14, Apr. 3, 1928, pp. 597–599, 5 figs. Pacific Fruit Express Co.'s Odgen, Utah, plant produces ice at power rate of 21 kw-hr. per ton during winter; no agitation is done; ice compares favorably with ice made with air agitation; plant contains 3 compressors which discharge into overhead main which carries hot gas to condensers placed outside building.

Oil-Engine Drive. Addition to an Ice Plant Returns 100 Per Cent Profit, E. J. Kates. Power, vol. 67, no. 12, Mar. 20, 1928, pp. 516–518, 4 figs. Describes extension to oil-engine plant built in 1926 by Nassau Consumers Ice Co. at East Rockaway, N. Y.; combined compressor-generator unit was installed; this is 60-hp. Diesel, direct-connected both to 40-kw. generator and through flexible coupling to two-cylinder vertica single-acting Carbondale compressor of 32-ton refrigerating capacity.

INDUSTRIAL MANAGEMENT

Budget Control. How to Budget Plant and Equipment Expenditure, J. J. Berliner. Factory, vol. 75, no. 3, Mar. 1928, pp. 532–533, 3 figs. Budget for plant and equipment consists of estimate of expenditures necessary for maintaining present equipment, and securing and maintenance of additional equipment demanded by budget program; estmate of cost of repairs; costs of construction of equipment by factory carefully recorded; periodical reports for comparison between amount appropriated for each class of expenditures and actual amount expended.

Price Fixing. Profit vs. Volume in Pricing, W. L. Churchill. Elec. World, vol. 91, no. 12, Mar. 24, 1928, pp. 615–617. Total productive capacity greatly in excess of absorbing capacity of market is pointed out as basis of two companion evils: (1) increased selling cost for selling effort is being expended to dispose of 100 per cent of industry's capacity; (2) price reductions are made in anticipation of volume sale that is impossible of attainment; net result is abnormal selling costs, subnormal selling prices and subnormal profits.

Production Control. Make Time and Space Earn Their Keep, F. L. Faurote. Factory, vol. 75, no. 3, Mar. 1928, pp. 541–545, 9 figs. Two basic principles of Ford production planning; 45 basic industries are made to contribute their products to final result; conversion of raw material into marketable product takes less than 35 hours; engineering and drafting departments leave little to chance and nothing to individual decision; material kept moving; shop-floor occupancy by component parts in process of finishing; wide use of conveyors.

Output Easily Varied by Special Machine Arrangement, K. W. Stillman. Automotive Industries, vol. 58, no. 11, Mar. 17, 1928, pp. 444–445, 2 figs. Method of Continental Motors Corp. gives flexibility by making it possible to cut out certain machines when necessary without interfering with production line; two parallel rows of machine tools separated by sheet-steel-topped table extending length of aisle which serves as both repository for pieces in process and as conveyor.

Systematic Production Control of Small Parts, F. J. Oliver. Am. Mach., vol. 68, no. 13, Mar. 29, 1928, pp. 519–522, 4 figs. Production control scheme at Bloomfield Works of General Electric Co.; plant manufacturers for part stock at such rate as will maintain economical inventory in relation to predicted sales; maximum and minimum inventory determined by sales records and most economical manufacturing quantity is determined mathematically with all factors taken into account.

Profits and Sales. How to Get the Most Profits Out of Business, E. S. LaRose. Soc. Indus. Engrs.—Bul., vol. 10, no. 2, Feb. 1928, pp. 3–8. Example of typical industrial plant where wide and varied scope of products is produced; analysis of balance sheet; profit-and-loss statement; product classification and analysis; distribution methods; materials; labor; overhead; production planning and schedules; inventory; office routine; reports; budgets.

Production's Part in Sales and Profits, G. W. Gair. Factory, vol. 75, no. 3, Mar. 1928, pp. 505–509, 3 figs. Quality, service, and economy as means used by Robert Gair Co. to keep profits at satisfactory level; presses laid out diagonally; laboratory or research and quality control; building up highly skilled and loyal personnel; production and maintenance working hours; attracting top grade of paper makers with good working conditions; holding costs down, and prices accordingly.

Progress in United States. Fifty Years of Scientific Management, W. Lewis. Mfg. Industries, vol. 15, no. 4, Apr. 1928, pp. 249–252, 2 figs. Author states that progress in American industry is founded largely on new conceptions brought forth by F. W. Taylor; his principles are fundamental to successful manufacturing; industry has deviated from Taylor System only in methods of applications and in mechanisms employed; system has been found adequate for all purposes during both rush and slack periods; it has given full control over plant operations in simplest possible manner.

Prosperity Planning. Must Prosperity Be Planned? H. B. Brougham. Taylor Soc.—Bul., vol. 13, no. 1, Feb. 1928, pp. 2–8 and (discussion) 12–22. Discusses problem as to whether effective demand can be adapted, controlled and graduated in step with constant increases in productive capacity; analysis indicates that savings in process, whether by superior force or organization or by improved machinery, tend to accumulate in form of unused facilities; outlets into "non-productive" public works; outside field of non-productive public works lies domain of new and productive private industries.

Reorganization. More Thinking Needed at the Top, S. Norvell. Iron Age, vol. 121, no. 12, Mar. 22, 1928, pp. 797–798. Methods of manufacturer in reorganizing to cut costs; sales department reorganized with eye to profits; conservative factory superintendent blocked changes, and engineer was hired to introduce new methods; success of large companies due to emphasis on getting results; lack of thinking at top main weakness of business; competition that proved mythical.

Time Study. Psychology of Time Studies in the Shop, M. Moisescu. Taylor Soc.—Bul., vol. 13, no. 1, Feb. 1928, p. 60. Brief abstract translated from "Industrielle Psychotechnik," vol. 4, no. 4, Jan. 1927; author gives result of most thoroughgoing research into various means and methods for time observations, and into psychology of their application; under three subdivisions, "stop" method, "continuous" method, and "count-off" method, he considers merits and demerits of ordinary stop watch and two new models of non-stop watches.

INDUSTRIAL TRUCKS

Electric. Trucks Facilitate Handling Operations in Machine Shops. Iron Trade Rev., vol. 82, no. 14, Apr. 5, 1928, pp. 870–871 and 878, 2 figs. Electric equipment adapted to work in process; crane trucks for machine-shop haulage; parts exceeding capacity of crane truck handled by overhead cranes; services rendered by light utility straight-platform truck; specially designed trucks for plants handling large amounts of material in tote cans. Abstract from "Profitable Application of Electric Industrial Trucks and Tractors in Industry," published by Soc. for Elec. Development, Inc.

INTERNAL-COMBUSTION ENGINES

See AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GASOLINE ENGINES; OIL ENGINES.

IRON CASTINGS

Defects. Hidden Defects in Iron Castings, P. R. Ramp. Iron Age, vol. 121, no. 12, Mar. 22, 1928, pp. 791–793 and 841, 4 figs. Method of localizing shrink cavities and blowholes to places where they can do no real harm to casting; locating hidden defects; insufficient metal pressure on surface of molds and cores is cause; dense and strong metal occurs naturally at lowest point; where gases go; defects caused by chaplets; other types of hidden defects.

L

LATHES

Cutting-Time Charts. Graphical Cutting-Time Charts for Lathes (Graphische Laufzeittafel fuer Drehbaenke in Verbindung mit AWF-Richtwerten), L. Boettcher. Maschinenbau (Berlin), vol. 7, no. 5, Mar. 1, 1928, pp. 227–229, 2 figs. Presents charts, based on standards adopted by German AWF (Committee on Economic Production), giving directly time of running of lathe for various materials and types of cutting; illustrative examples.

High-Speed. A New Lathe and a New Tool. Engineer, vol. 145, no. 3761, pp. 158 and 166, 3 figs. Details of machine exhibited at Raw Materials Exhibition in Berlin; it is stated that Schiess-Defries extra-high-speed lathe is only machine in existence on which new cutting metal can be used to its full capacity; it is driven by 35-hp. d.c. motor mounted on extension of bed beyond headstock.

LIQUIDS

Friction of. A New Theory of Liquid Friction (Nuova Teoria dell'Attrito dei Liquidi), C. F. Mancini. Industria (Milan), vol. 42, no. 3, Feb. 15, 1928, pp. 66–70, 3 figs. Theo-

retical mathematical analysis; first chapter treats of principles of hydrodynamics bearing on this analysis. (To be continued.)

LOCOMOTIVE TERMINALS

Fireless. Grand Trunk Western Equips Fireless Enginehouse at Chicago. Ry. Age, vol. 84, no. 15, Apr. 14, 1928, pp. 861–863, 6 figs. Recent installation of direct steaming equipment at Elsdon engine terminal of Grand Trunk Western, located within limits of Chicago, has resulted in almost complete elimination of smoke and has actually created fireless enginehouse; system expedites dispatching locomotives; terminal consumption of fuel reduced; description of installation; power plant.

LOCOMOTIVES

Baldwin. New Pacific Type and Heavy Switching Locomotives of the Central of New Jersey. Ry. and Locomotive Eng., vol. 41, no. 2, Feb. 1928, pp. 31–33, 2 figs. Passenger locomotives of 4–6–2 type handle heaviest through passenger trains of road; total weight is 326,470 lb., weight on drivers 197,660 lb., tractive force is 46,840 lb.; 0–8–0 type switchers used in classification yard at Elizabeth, N. J., and in hump-yard service, have tractive force of 61,422 lb.; detail of both passenger and switching engines are given in accompanying table; built by Baldwin Locomotive Works.

Battery-Oil-Electric. Battery-Oil-Electric Locomotive. Ry. Elec. Engr., vol. 19, no. 3, Mar. 1928, pp. 78–80, 4 figs. Novel type of power is being tried by New York Central for service on West Side lines in New York City; since locomotive will be used mainly in yards that are not electrified, a 300-hp. oil engine direct connected to a 200-kw. generator is provided for charging battery; as locomotive will be called on at times to operate over tracks which are electrified, third-rail shoes are provided and also overhead collector; mechanical design; traction motors; control; battery; meters; engine and generator; weights and dimensions.

Diesel. Diesel Engines for Railroad Traction, D. L. Bacon. Ry. Age, vol. 84, no. 11, Mar. 17, 1928, pp. 635–638. Discussion of adaptability, weight and cost per horsepower and types of transmissions; Kitson-Still engine incorporates steam and Diesel cycles at opposite ends of double-acting cylinders; clutch and gear drive transmission; comments on shape of tractive-force curve. Abstract of paper presented before New England Railroad Club.

Electric. See ELECTRIC LOCOMOTIVES.

Feedwater Heaters. Waste-Steam Feedwater Heaters for Locomotives (Versuche der Italienischen Staatsbahnen mit Abdampfvorwaermern fuer Lokomotiven), G. Corbellini. Organ fuer die Fortschritte des Eisenbahnwesens (Berlin), vol. 83, no. 4, Feb. 15, 1928, pp. 61–67, 2 figs. Report on experience of state railroads of Italy; special tests of Knorr, AGFI and Friedmann preheaters with locomotives at rest and in motion, determination of fuel economy, comparative study of cost of waste-steam preheating by various types of preheaters.

High-Pressure. Advancement and Advantages of High Boiler Pressures, W. G. Tawse. Ry. and Locomotive Eng., vol. 41, no. 1, Jan. 1928, pp. 5–7, 1 fig. Compounding either 2, 3 and 4 cylinders employed to secure full advantage of higher pressures; salient features of some high-pressure boilers; Berlin Machine Works, Germany, are developing 2500-hp. locomotive on Loeffler system with steam at 1450 lb.; 2000-hp. Ljungström turbine locomotive for London, Midland and Scottish Ry.; Krupp Works of Germany have built 2800-hp. turbo-locomotive using Zoelly-type turbine.

Oil-Burning. Furnace Conditions in Oil-Burning Locomotives, G. M. Bean. Ry. and Locomotive Eng., vol. 41, no. 1, Jan. 1928, pp. 7–9. Consideration of principles of combustion of fuel oil as compared with other or so-called solid fuels; flame study as pertaining to furnaces operating in higher temperature ranges; reasons leading to adoption of steam burner in locomotive practice; discussion tends to show need for rapid diffusion of vapor and air toward end that complete combustion and high furnace temperatures will result in brief time allotted and in relatively limited furnace volume provided even in modern locomotive design.

Pulverized-Coal. The A.E.G. Pulverized-Coal Locomotive (Die AEG-Kohlenstaub-Lokomotive), D. W. Kleinow. Glasers Annalen (Berlin), vol. 102, no. 5, Mar. 1, 1928, pp. 59–62 and (discussion) 62–70, 11 figs. Report on trial trips of first A.E.G. pulverized-coal locomotive; merits of firing of locomotives with pulverized coal, economy and costs; discussion by Hinz and Landsberg. (Concluded.)

Valve Gears (Caprotti). Caprotti Poppet Valve Gear as Applied to Locomotives, W. A. Austin. St. Louis Ry. Club—Official proc., vol. 32, no. 10, Feb. 10, 1928, pp. 194–213, 10 figs. In 1921, Italian engineer, Arturo Caprotti, produced fully revolving "angular" mechanism for operation of poppet valves; one Caprotti locomotive in America is Consolidation engine no. 2722 of Baltimore & Ohio Railroad; valve is very closely balanced; describes driving unit; points described will indicate important economies in maintenance; Caprotti valve gear will save fuel, water and oil and will develop more mean effective pressure for given point of running cut-off.

LUBRICANTS

Viscosity. The Viscosity of Lubricants at High Pressure. Engineering (Lond.), vol. 125, no. 3243, Mar. 9, 1928, p. 281. Review of investigation by National Physical Laboratory in hope that light might be thrown upon reason for relative inferiority of mineral lubricants, as compared with those of animal and vegetable origin; contrary to expectation, viscosity of mineral oils was found to increase more rapidly than that of their rivals.

M

MACHINE-SHOP PRACTICE

American. American Machining Methods, J. G. Young. Automobile Engr. (Lond.), vol. 18, no. 239, Mar. 1928, pp. 93–96, 5 figs. Observations on modern machining practice with particular reference to broaching and honing; broaching small quantities; special broaching operations; hydraulic broaching; honing or grinding; possibilities of new method of grinding. Abstract of paper presented to Inst. Production Engrs.

MACHINE TOOLS

Alignment. Accuracy in Large Machine Tools, H. K. Smyth and W. C. Wais. Am. Mach., vol. 68, no. 14, Apr. 5, 1928, pp. 581–583, 11 figs. Methods of aligning heavy machines; in fitting spindle bearings of engine lathes, car-wheel and driving-wheel lathes and large milling machines, special mandrels have been prepared for each size and type of machine; aligning headstocks; special foundations prepared to aid in erection of larger types; squaring up housings of boring mills and planers; fluctuations of temperature disturb alignment of heavy machines; two methods of checking gears.

Charts for. Charts for Metal-Cutting Machine Tools (Maschinenkarten fuer spanabhebende Metallbearbeitung), F. Kresta. Sparwirtschaft (Vienna), no. 2, Feb. 1928, pp. 80–87, 12 figs. Criticizes machine charts published by German AWF (Committee for Economic Production) and offers series of original alignment charts for operation of shapers, planers and other machine tools.

Planer or Miller. A Practical Chart (Raboteuse ou fraiseuse, un abaque pratique). Pratique des Industries Mécaniques (Paris), vol. 10, no. 12, Mar. 1928, p. 518, 1 fig. Method of constructing chart to enable one to see at once if it is more economical to execute metal-working job by planing or by milling.

Electric Feed. Modern Feed Regulation of Machine-Tools (Neuzeitliche Steuerungen fuer Werkzeugmaschinen-Antriebe), O. Pollok. Elektrotechnik und Maschinenbau (Vienna), vol. 46, no. 10, Mar. 4, 1928, pp. 215–218, 8 figs. Describes and discusses special use of A.E.G. motors for feed regulation of planers and lathes.

Finishing by Grinding. Finishing by Machine Supersedes Costly Scraping by Hand, L. Sichel. Iron Trade Rev., vol. 82, no. 11, Mar. 15, 1928, pp. 685–686, 3 figs. Problem of finishing ways by abrasive method solved; quality of bearing obtained not commercially possible with handwork; counter-balancing of heavy radial that carries grinder heads; all errors of deflection or play eliminated; proving that machine is economically justifiable.

Manufacture. Accuracy in Large Machine Tools, H. K. Smyth and W. C. Wais. Am. Mach., vol. 68, no. 13, Mar. 29, 1928, pp. 527–530, 10 figs. Methods used in Niles plant for securing accuracy in large machine tools; constant temperature maintained in room where standard gages are kept; long measuring machine; aligning large machine tools; all cylindrical work finished by grinding; system of rigid tool inspection; all reamers are of inserted-blade type; reaming machine.

Mass Production. Special Mass-Production Machines. Am. Mach., vol. 68, no. 12, Mar. 22, 1928, p. 504, 4 figs. Details of special machine tools for mass production illustrated by 4 halftones, each accompanied by short description; device for feeding steel tubes into centerless grinder; machine that makes wooden spoolheads from blocks containing number of holes; attachment from feeding hard rubber tubes into centerless grinder.

Pneumatic Operation. Pneumatic Machine Tools and Equipment for Manufacturing Plants (Pressluftwerkzeugmaschine und Pressluftvorrichtung in der Fertigung), K. Bollinger. Maschinenbau (Berlin), vol. 7, no. 5, Mar. 1, 1928, pp. 215–218, 9 figs. Historical sketch of pneumatic operation methods in Germany and other countries; control of air-compressor plants by "lumographs" and other apparatus; graphs of running time of air compressors in manufacturing plants, air-compressor fittings; possible applications of compressed air in woodworking, especially piano manufacture.

MACHINERY

Leipzig Exhibition. The Leipzig Fair. Engineering (Lond.), vol. 125, no. 3243, Mar. 9, 1928, pp. 282–286, 23 figs. partly on supp. plates. Comparison of British Industries Fair with Leipzig Fair; main object of both is to market well-established products; this is why appeal is rather to non-expert user than to expert producer; in organization of means to attain this end Leipzig is superior to Birmingham; permanency is keynote; most impressive section of Technical Fair is large building known as Hall 9, organized by German Assn. of Machine Tool Mfrs.; review of machine-tool exhibits and other machinery including internal-combustion engines, concrete mixers, etc.

The Technical Fair at Leipzig. Engineer (Lond.), vol. 145, no. 3766, Mar. 16, 1928, pp. 284, 286, 10 figs. Fair is marked chiefly by construction of new hall for exhibition of commercial road vehicles; predominant type of motor-vehicles appear to be single-deck motor-buses, though trucks, tipping wagons, fire-service vehicles, tradesmen's delivery tricycles, etc., were represented; bulk of exhibits were German; review of machine-tool exhibits; and exhibits of Committee for Economic Production, consisting of collection of examples of special mechanical motions.

Work Meters. The Work Meter. Engineer (Lond.), vol. 145, no. 3767, Mar. 23, 1928, pp. 328–330, 6 figs. Device for measuring working of machinery such as lathe, loom, dye vat, motor vehicle, rubber vulcanizer, marine engine; to obtain record of speed at which it is run, when it is stopped and started and length of periods during which it is active or idle; principle employed; consists of using electric contact maker which is fitted to some part of machine, and which at end of ever so many revolutions of machine sends impulse to distant recorder consisting of strip of paper moving beneath stylus at uniform rate under control of clock.

MATERIALS HANDLING

Machine Shops. Modern Shop Transportation Methods. Machy. (N. Y.), vol. 34, no. 8, Apr. 1928, pp. 576–577, 8 figs. Various methods of handling materials in modern shops illustrated; Yale electric industrial truck; Elwell Parker truck used in transporting castings between foundry and machine shop; Baker locomotive crane type of truck; Stuebing hand lift truck; Cowan hand lift truck used for moving completed machine by means of platform skids.

More Tools Made with Fewer Men, F. L. Prentiss. Iron Age, vol. 121, no. 13, Mar. 29, 1928, pp. 857–862, 8 figs. By installation of materials-handling equipment, production has been increased and labor costs have been sharply reduced in plant of Vichek Tool Co.; twice as much output per man; bucket elevators; gravity conveyor line extends in front of furnaces; in inspection department tools are inspected and weigh-counted; roller conveyor extends length of shipping room.

MILLING

Large-Radius Arcs. Milling Arcs of Large Radii, E. V. Erickson. Machy. (N. Y.), vol. 34, no. 8, Apr. 1928, p. 585, 1 fig. Method of cutting arc of large radius with milling cutter of ordinary dimensions; basis for method lies in fact that portions of perimeter of ellipse approximate very closely arc of circle; if work and cutter assume some intermediate position, arc of ellipse will be cut; definite relation exists between intermediate position and radius of portion of perimeter of ellipse.

MOLDING MACHINES

Sand Projection. A New Machine for Molding by Projection of Sand (Une nouvelle machine à mouler par projection de sable). Pratique des Industries Mécaniques (Paris), vol. 10, no. 12, Mar. 1928, p. 515, 1 fig. Describes machine which projects sand into molds by means of compressed air; does away with hand tamping of sand in mold.

O

OIL ENGINES

Heavy-Oil. Heavy-Oil Engine Working Costs. Engineer (Lond.), vol. 145, no. 3764, Mar. 2, 1928, pp. 246–247. Summary of report to Diesel Engine Users Assn.; average total engine cost of 41 home stations with total output of 44,000,000 units and average annual plant load factor of 14.7 per cent was 0.713 pence per unit generated, which compares favorably with corresponding figure of 0.799 pence for previous year.

OPEN-HEARTH FURNACES

Gas Flow. Gas Flow in Open Hearth Furnaces, K. Feller. Blast Furnace and Steel Plant, vol. 16, no. 3, Mar. 1928, pp. 373–375, 1 fig. Abstract of studies made on flow of gas and gas composition in various types of open-hearth furnaces; conditions of combustion and location of flame; tilting furnace; experiments on models; as result of temperature-variations during gas period composition of gas in port alters as function of preheating temperature.

Heat Losses. Certain Relations Between Refractory Service, Insulation, and the Flow of Heat in the Open-Hearth Furnace, B. M. Larsen and A. Grodner. Min. and Met. Investigations—Bul., no. 32, 20 pp., 12 figs. Irrespective of how much heat is lost through walls of open hearth, inner surface temperatures must remain about same to make possible given rate of steel production; inner wall and bath temperatures are controlled essentially from within furnace.

OXYACETYLENE CUTTING

Repair Work with. Emergency Repairs to Sheet Mill Drive Made by Cutting Blow Pipe and Oxygen Lance, W. I. Gaston. Iron Age, vol. 121, no. 11, Mar. 15, 1928, p. 735, 1 fig. Manner in which cutting blow pipe saved $1900 in repairing main drive gear; 470 cu. in. of cast steel cut away in order to renew grip on shaft; required 14 hr. for five men to remove bolts and do this job of cutting; cost amounted to about $110; section cut was 3 ft. 11 in. in length and 15 1/2 in. in breadth, how shaft was protected and work done.

P

PIPE

Welded, Manufacture of. Modern Methods of Manufacturing Welded and Seamless Pipes (Die Neuzeitliche Fabrikation von geschweissten und nahtlosen Roehren), H. Schumacher. Werkstattstechnik, vol. 22, no. 3, Feb. 1, 1928, pp. 61–66, 17 figs. Description of modern Berman machines and processes for rolling, drawing, cutting, trimming, welding, thread cutting, etc. of metal pipes and tubes for gas and water supply.

PIPE BENDS

New Process. Pipe Bends Made by New Process. Iron Age, vol. 121, no. 14, Apr. 5, 1928, pp. 933–934, 3 figs. Forcing hot pipe over horn-shaped mandrel produces short-radius bends without buckling at inside of turn or excessive thinning at outer diameter; methods of Pipe Bending Process Co.; manufacturers believe definite series of bends with long and short radius will take care of practically every requirement in way of fitting for welded piping; steel, copper, brass, aluminum and special alloys successfully formed into short-radius bends; equipment consists of gas furnace, special mandrels and hydraulic press.

PIPING

Power-Plants, Welding. Welding of Power Plant Piping, A. W. Moulder. Am. Welding Soc.—Jl., vol. 7, no. 2, Feb. 1928, pp. 8–20, 16 figs. Presentation is intended to cover subject as it relates to fusion welding of power-plant piping only and is not intended to relate to forge or hammer-welding process; discussion is based upon use of oxyacetylene rather than electric-arc process; primarily for reason that former process is one which has been found most practical for work of this kind; advantages of welding power-plant piping.

POWER PLANTS, HYDROELECTRIC

Ireland. The Shannon Power Plant. Engineer (Lond.), vol. 145, no. 3767, Mar. 23, 1928, pp. 318–320, 10 figs. Describes plant that is to be erected in generating station at Ardnacrusha; at outset there are to be three turbines, each capable of giving maximum output of 38,600 hp., two of which are being supplied by J. E. Escher, Wyss and Co., of Zurich; useful head of water at power station will depend on ebb and flow of tide in lower part of Shannon, and head will vary from 86.7 to 110.6 ft.

Louisville, Ky. The New Ohio River Power Plant of Louisville Hydro-Electric Co. Water Works, vol. 67, no. 3, Mar. 1928, pp. 123–125, 5 figs. 100,000-kw. hydroelectric station under automatic control; present installation consists of eight 12,500-kva., vertical-shaft generators operating on terminal voltage of 14,000; principal unique feature of station is electrical layout; interesting engineering feature of station; advantages of automatic switching.

POWER PLANTS, STEAM

Chemical Plants. A Power Station for a Chemical Works. Engineer (Lond.), vol. 145, no. 3766, Mar. 16, 1928, p. 299. Particulars of contract secured for plant of new power house by Metropolitan-Vickers Electrical Co.; contract is for 9 turbo-alternator sets, with aggregate output capacity of 93,000-kw. to form equipment of new power station for large chemical works under construction for Synthetic Ammonia and Nitrates, Ltd., at Billingham; combined power and process system will be applied on unusually large scale.

Coal Handling in. Coal-Handling System of Buffalo Utility, F. S. Helfter. Elec. World, vol. 91, no. 13, Mar. 31, 1928, pp. 655–656, 4 figs. In new arrangement two cars, after previously being weighed on track scale, are dumped simultaneously into four concrete hoppers which are built into existing trestle; shaking feeder located at mouth of each hopper feeds coal on to horizontal belt, which discharges on to inclined belt, delivering normally to 12-ft. × 19-ft. Bradford breaker; equipment, with exception of Bradford breaker, is driven by double squirrel-cage motors.

Detroit, Mich. The Trenton Channel Station, Detroit, Michigan, U. S. A. Engineering (Lond.), vol. 125, nos. 3245 and 3246, Mar. 23 and 30, 1928, pp. 342–345 and 369–371, 17 figs. Mar. 23: Whole of output of Trenton Channel is delivered to 120,000-volt system, mainly through two substations about equi-distant from plant; output voltage is so regulated as to provide required voltage at these substations; this feature has had considerable influence on design of plant. Mar. 30: Coal unloading arrangements.

Recording Instruments, Record Strips for. Standardized Record Strips for Boiler Instruments, H. Doevenspeck. Eng. and Boiler House Rev. (Lond.), vol. 41, no. 9, Mar. 1928, p. 447. According to form of record, recording instruments may be classified as disk, drum and continuous recorders; charts with standardized ruling can be produced more cheaply and used to greater advantage than variety of papers; author reproduces standard rulings recommended by German Industrial Standards Assn., together with particulars of rates of paper feed recommended for various purposes. Abstract translated from Waerme, Dec. 31, 1927, p. 875.

PRESSES

Economy. Improvement in Net Cost of Manufacture by Employment of Power Presses (L'amélioration du prix de revient des fabrications par l'emploi de la presse mécanique), J. Bertrand. Pratique des Industries Mécaniques (Paris), vol. 10, no. 12, Mar. 1928, pp. 495–498, 9 figs. Manufacture by automatic lathe compared to flanging by power press, as exemplified by manufacture of automobile cams, showing economy in use of press.

PROFILING MACHINES

Coulter. Coulter Profiling Machine Is Used on Combustion Chambers. Automotive Industries, vol. 58, no. 11, Mar. 17, 1928, pp. 448–449, 3 figs. Coulter automatic multi-spindle profiling machine for finishing combustion chambers of L-head engines; built in both horizontal and vertical types and in two sizes; finishing operation performed by means of milling cutters cutting on their sides and on their lower ends; electric motor drive; compensation for wear of cutter diameters.

PULVERIZED COAL

Burners. The "Buell" System of Pulverized Coal Firing, G. E. K. Blythe. Iron and Coal Trades Rev. (Lond.), vol. 116, no. 3133, Mar. 16, 1928, p. 377, 1 fig. In Buell burner air for combustion is supplied to propelling air in 3 separate streams; ignition and combustion take place instantaneously, maximum flame temperature developed; no loss of thermal value or unconsumed carbon. Abstract from paper read before Inst. Engrs. Shipbldrs. in Scotland.

Combustion. Heat-Power Research (Versuche aus dem Gebiete der Waermekraftforschung), M. Jakob. V.D.I. Zeit. (Berlin), vol. 72, no. 11, Mar. 17, 1928, pp. 379–380, 1 fig. Report on papers and discussions at fourth conference of German commission for research in heat engineering; review of papers on steam-discharge measurements, specific heat of superheated high-pressure steam, combustion phenomena in engines, combustion of pulverized coal under compression, etc.

PUMPS, CENTRIFUGAL

Losses. A New Method of Separating the Hydraulic Losses in a Centrifugal Pump, M. D. Aisenstein. Hydraulics (A.S.M.E. Trans.), vol. 50, no. 3, Jan.-Apr. 1928, 4 pp. and (discussion) pp. 4–7, 9 figs. Particulars of method by means of which friction and shock losses of given pump may be determined separately from its head-capacity curve, together with illustrative example.

Performance. A Method of Analyzing the Performance Curves of Centrifugal Pumps, J. Lichtenstein. Hydraulics (A.S.M.E. Trans.), vol. 50, no. 3, Jan.-Apr. 1928, 12 pp. and (discussion) pp. 12–16, 25 figs. Development of analytical and graphical methods of determining correction factors from test curves for use in bringing theoretical pump equations into harmony with practice; author uses five correction factors which are to be deduced from ordinary performance curves; graphical analysis of 10-in. Bethlehem centrifugal pump tested at 1150 r.p.m., based mainly on b.hp. curve; only curves obtained by direct measurement of b.hp. through torsion or electrical dynamometers should be used.

R

RAILWAY MOTOR CARS

Gasoline-Electric. Gas Electric Car of the Toronto, Hamilton and Buffalo. Ry. and Locomotive Eng., vol. 41, no. 2, Feb. 1928, pp. 33–34, 2 figs. Power is supplied by Winton 6-cylinder 275-hp. gasoline engine; at 1050 r.p.m.; generator has continuous rating of 420 amperes at 440 volts; power plant is mounted crosswise of car, with generator directly behind operator; gearing is suitable for maximum operating speed of 60 m.p.h.

What the Gas-Electric Car Means to the Railroads, W. R. Stinemetz. Ry. Age, vol. 84, no. 13, Mar. 31, 1928, pp. 753–755, 2 figs. Typical example of average month's operation of motor car and trailer, actually substituted for branch-line steam train; multiple-unit gas-electric trains; fuel costs as compared to steam locomotives are less; provides more flexible means of handling varying crowds of traffic by always having full powered train irrespective of size.

Storage-Battery. Edison Storage Battery Rail Car Successful in Canterbury District (N. Z.). New Zealand Rys. Mag. (Wellington), vol. 2, no. 10, Feb. 1, 1928, pp. 10–11, 1 fig. Careful consideration was given to question of comparative cost as between rail car and steam driven train before experiment was launched; car can run approximately 100 miles on one battery.

RAILWAY REPAIR SHOPS

Quebec. New Repair Shop at Quebec. Elec. Ry. Jl., vol. 71, no. 10, Mar. 10, 1928, pp. 389–391, 9 figs. Main shop building and carhouse were constructed; additions provide boiler room, general storeroom and lumber storage; interior transfer tables not affected by extreme winter conditions; Quebec Railway, Light, Heat and Power Co., at Limoilou, supplies all electric power and gas used in vicinity of Quebec and operates city tramway system as well as 25-mile suburban line; list of various machine tools is given on accompanying plan.

REFRIGERATING MACHINES

Carbon Dioxide. Carbon Dioxide Refrigerating Machines, J. C. Goosmann. Power, vol. 67, no. 12, Mar. 20, 1928, pp. 518–519. Early experiments with carbon dioxide; modern compressor designs; increasing machine output. Abstract of paper read before Milwaukee Eng. Soc.

Compressor Charts. Practical Tonnage Chart, G. V. Rupp and H. W. Whiting. Ice and Refrigeration, vol. 74, no. 3, Mar. 1928, p. 274, 1 fig. Presents chart with variable-compressor size, back pressures, and speeds, and with volumetric efficiencies taken approximately as average of various makes of vertical single-acting compressors; calculations are based on U. S. Bureau of Standards tables.

REFRIGERATION

Silica Gel System. Silica Gel Refrigerating

System. Ice and Refrigeration, vol. 74, no. 3, Mar. 1928, pp. 217–221, 10 figs. New dry-absorption system; composition and properties of silica gel; arrangement and operation of refrigerating system; thermostatic control; household and commercial units; apparatus in operation exhibited; application to refrigeration cars being tested in actual service.

ROLLING MILLS

Blooming Mills, Electric Equipment. 40" Reversing Blooming Mill, Wisconsin Steel Co., F. A. Wiley. Iron and Steel Engr., vol. 5, no. 3, Mar. 1928, pp. 120–126, 10 figs. Details of electrically driven mill of Wisconsin Steel Works of International Harvester Co.; layout of motor room; reversing-roll motor; variable-voltage d.c. power; switching and control equipment; auxiliary power transformer; stripping of ingots by two 150-ton electrically operated stripper cranes; control panels; two men control rolling process.

Blooming Mills, Germany. Details of Reversing Blooming Mills (Eizelheiten von Umkehrblockwalzwerken), F. Funke. V.D.I. Zeit. (Berlin), vol. 72, no. 9, Mar. 3, 1928, pp. 311–316, 16 figs. Supplementary information to paper by same author in previous issue (Feb. 18, p. 197) describing reversing blooming mills of A. Thyssen metallurgical works at Hamborn, and Phoenix works at Ruhrort; details of motors, pinions, pinion housings, roll housings, spindles, top-roll accessories, methods of balancing, etc.

Power Requirements. Calculation of Power in Rolling Mills (Calcul des efforts dans les laminoirs), L. Genfron. Pratique des Industries Mécaniques (Paris), vol. 10, no. 12, Mar. 1918, pp. 519–521, 2 figs. Shows how to calculate power necessary to drive rolls of rolling mills when rolling thin plates if pressure on upper rolls and reduction in plate thickness are known.

Sheet Mills, Continuous. Continuous Mill Will Supply Bars for Tin Plate Division, F. B. Pletcher. Iron Trade Rev., vol. 82, no. 12, Mar. 22, 1928, pp. 749–751, 2 figs. Modern 21-in. 2-high continuous sheet bar and skelp mill of Youngstown Sheet & Tube Co.; light weight tin bars delivered by finishing rolls at high speed are made to overlap before reaching bar piler; three hot beds are provided; 21-in. mill laid out parallel to 28-in. billet mill; slab transfer with approach tables, and 1000-ton motor driven up-cut shear installed. See also description, by R. A. Fiske in Iron Age, vol. 121, no. 12, Mar. 22, 1928, pp. 799–802, 6 figs.

S

SEA

Cold Water at Great Depths, Utilization of. Utilization of Cold Water from the Depth of Oceans (Utilisation rationnelle de l'eau glacée du fond des océans), P. Boucherot. Revue Universelle des Mines (Liége), vol. 17, no. 5, Mar. 1, 1928, pp. 205–214. Points out that low temperature of ocean water at great depths is natural product, in unlimited quantities, which can be visualized as future source of low temperature, with possibilities of utilization for cooling purposes, production of energy, and softening of water; in process described refrigeration may be regarded as by-product of power generation, or vice versa; water softening is effected by distillation in vacuum of surface water.

SEAPLANES

Pontoon and Ski (Fairchild). The Fairchild Ski-Float. Aero Digest, vol. 12, no. 2, Feb. 1928, p. 192, 1 fig. Combination ski and pontoon planes built by Fairchild Airplane Mfg. Corp. for Canadian Transcontinental Airway described; planes take off from land on either snow or water; anti-spray floats are larger than standard and bottom surface is of extra heavy gage duralumin; ski unit built integral with bottom of float and shaped to contour of keel; rear end of ski mounted on two doughnut type rubber shock absorbers; aprons prevent snow from getting in between ski and float.

SCREWS

Cap, Manufacture of. Cap Screws Made by New Method, F. L. Prentiss. Iron Age, vol. 121, no. 14, Apr. 5, 1928, pp. 936–938, 3 figs. Recent improvements in processes of making cold-headed cap-screws employed by Cleveland Cap Screw Co.; blank for threading produced by extrusion process; increase of 30 per cent in tensile strength claimed; wire reduced to proper pitch diameter simultaneously with heading; trimmed screws pass through tumbling and lubricating machine; heat treated in electric furnace; passed through quenching machine into rustproofing solution.

SPRINGS

Testing Machines. The Southwark-Emery Hydraulic Spring Testing Machine, F. G. Tatnall. Baldwin Locomotives, vol. 6, no. 4, Apr. 1928, pp. 45–46, 2 figs. Testing machine, embodying Emery hydraulic weighing system; maximum capacity of tester is rated at 200,000 lb., machine can also be equipped to autographically record tests on strip of paper; both loading and unloading curves can be conveniently plotted with this machine.

STEAM ENGINEERING

Research. Heat-Power Research (Versuche aus dem Gebiete der Waermekraftforschung), M. Jakob. V.D.I. Zeit. (Berlin), vol. 72, no. 11, Mar. 17, 1928, pp. 379–380, 1 fig. Report on papers and discussions at fourth conference of German commission for research in heat engineering; review of papers on steam-discharge measurements, specific heat of superheated high-pressure steam, combustion phenomena in engines, combustion of pulverized coal under compression, etc.

STEAM ENGINES

Binary-Vapor. Working Fluids Which May Be Used in Power Generation (Die moeglichen Arbeitsmittel der Dampfkraftanlagen), A. Loschge. Archiv fuer Waermewirtschaft (Berlin), vol. 9, no. 3, Mar. 1928, pp. 75–79, 13 figs. Thermodynamics of engines using mercury vapor, ammonia, diphenyl-oxide, or other vapors jointly with steam, steam being generated by condensing of fluid of higher boiling point; principal American and European systems, results of experiments.

Uniflow. 800-Hp. Heat-Extraction Uniflow Compound Engine. Engineering (Lond.), vol. 125, no. 3244, Mar. 16, 1928, pp. 318–319, 6 figs. partly on p. 317 and supp. plate. Cross-compound heat-extraction engine, built by Galloways, Ltd., Manchester, to replace existing set of engines in Burnley textile mill.

STEAM PIPE LINES

Flexibility. The Flexibility of Plain Pipe Lines, J. R. Finniecome. Metropolitan-Vickers Gaz. (Manchester), vol. 10, no. 179, Feb. 1928, pp. 327–333, 7 figs. Graphic method of determining flexibility of any pipe bend; method when whole pipe bend is in one plane, and when pipe does not lie in one plane; wire model method; graphical method; actual deflection-stress factor for U-bends; ratio of actual deflection-stress factor to theoretical deflection-stress factor; ratio of test and theoretical deflection-thrust factor.

STEAM TURBINES

Lubrication. The Circulation System in the Oiling of Steam Turbines. Power House (Toronto), vol. 22, no. 3, Feb. 5, 1928, pp. 31 and 42. Systems of lubrication decided on; individual ring-oiled bearings for small auxiliary type of turbine and improved circulation system for main units; constant circulation; needs light-bodied oil; mineral and petroleum acids; after oil is put into service in turbine circulating system, petroleum acids may be formed.

STEEL

Alloy. See ALLOY STEELS.

Automobile, Machinability of. The Machinability of Steels in Automobile Construction (Die Bearbeitbarkeit der Konstruktionsstaehle im Automobilbau), G. Schlisinger. Stahl u. Eisen (Duesseldorf), vol. 48, nos. 10 and 11, Mar. 8 and 17, 1928, pp. 307–312 and 338–345, 22 figs. Determination of best cutting speeds and feeds for machining of case-hardened and high-grade standard steels; comparative investigation with ordinary mild open-hearth steels; influence of water cooling; importance of standardizing alloyed and unalloyed structural steels.

Cold Working. The Influence of Cold-Drawing on Mild Steel, R. M. Brown. Iron and Coal Trades Rev. (Lond.), vol. 116, no. 3132, Mar. 9, 1928, p. 341. Author bases conclusions on research divided into five sections, but says single research can only indicate probabilities; internal stresses due to elastic recovery of material not proportional to work done; cold-drawn steel may be used freely, provided that Izod value is satisfactory. Paper read at Instn. Engrs. and Shipbldrs. in Scotland.

Heat Treatment—Quenching. On a New Method of Quenching Steels in a High Temperature Bath, K. Honda and K. Tamaru. Tohoku Imperial Univ.—Science Reports (Sendai, Japan), vol. 17, no. 1, Jan. 1928, pp. 69–83, 7 figs. Method of obtaining tempered structures by single process without risk of internal failure in steels, which might result during quenching; steels quenched in salt bath heated to high temperatures up to 570 deg., and their hardness and microstructure examined; maximum hardness at quenching temperature of 110 deg. (In English.)

Manufacture, Direct Process of. Direct Steelmaking Process for the Manufacture of Rustless Steel. Swedish Export (Stockholm), vol. 12, no. 3, Mar. 1928, p. 32. Plan for making steel direct from iron ore instead of first reducing ore to pig iron; Flodin-Gustafson process; melting briquettes of iron concentrate and charcoal in electric furnace; intimate mixing of finely distributed iron ore with charcoal, shortens reduction process and gives product that can be rolled.

Strength at High Temperatures. Determining Endurance of Steel at High Temperatures (Ermittlung der Dauerstandfestigkeit von Stahl bei erhoehten Temperaturen), F. Koerber. Zeit. fuer Metallkunde (Berlin), vol. 20, no. 2, Feb. 1928, pp. 45–49 and (discussion) 49–50, 13 figs. Points to necessity of testing materials at high temperatures; inadequacy of usual hot tensile tests; influence of time; endurance strength as limit load for continuous deformation; results of new tests; study of expansion; importance of strain hardening and recrystallization; simplified method for determination of endurance.

STOKERS

Chain-Grate. A Chain-Grate Stoker Without Ignition Arch. Power, vol. 67, no. 13, Mar. 27, 1928, p. 569, 2 figs. Boiler and Stoker Engineering Co., New York City, has developed stoker that will operate without usual ignition arch; it can be installed under many boilers where installation of ordinary chain grate with its ignition arch would not be practicable.

Traveling-Grate. The Roubaix Type H Traveling Grate (La grille mécanique "Roubaix" type H). Technique Moderne (Paris), vol. 20, no. 5, Mar. 1, 1928, pp. 203–205, 6 figs. Describes construction operation and advantages of new type of chain grate mechanically operated.

T

TOLERANCES

Skoda System, Czechoslovakia. System of Tolerances Used at the Skoda Works at Pilsen, Czechoslovakia (Le système de tolerances employé aux usines Skoda à Pilsen, Tchéco-Slovaquie), N. Sawine. Génie Civil (Paris), vol. 92, no. 11, Mar. 17, 1928, pp. 260–262, 5 figs. Comparison of German D.I.N. system of tolerances for bores and Skoda system; analysis of Skoda system; graphs of tolerances used; system used on drawings for indicating five classes of precision.

TURBO-GENERATORS

Foundations, Vibration of. Computed and Measured Vibrations of a Turbine Foundation (Rechnerisch ermittelte und gemessene Schwingungszahlen en einen Turbinenfundament), G. Mensch. Bauingenieur (Berlin), vol. 9, no. 9, Mar. 2, 1928, pp. 152–163, 5 figs. Plan and section of 12,500-kw. turbo-generator installation at Wilmersdorf power plant, of Elektricitaetswerk Sudwest A.G.; comparison of vertical and horizontal vibrations of foundation, as determined mathematically and as actually measured by means of Schenk instrument, shows that computed values are in excess of measured values.

Vibration of Turbine-Generator Foundations, T. C. Rathbone. Power, vol. 67, no. 14, Apr. 3, 1928, pp. 588–592, 6 figs. Points out that customary efforts to avoid resonance by design are quite insufficient, most structures are too complex to predetermine many modes of vibration, and many harmful or beneficial features affecting smooth running are too often overlooked; how mass and elasticity affect natural frequencies; presents chart for finding critical-speed coefficients.

W

WIRE DRAWING

Power Required in. Power Consumption and Flow of Metal in Wire Drawing, J. D. Brunton. Wire, vol. 3, no. 3, Mar. 1928, pp. 79–80, 1 fig. Number of readings have been taken with idea of trying to arrive at actual horsepower necessary for drawing different sizes of wire; wide range of sizes and qualities of material were taken, and formula worked out.

THE ENGINEERING INDEX

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AIRPLANE ENGINES

Brewer. Radial Air-Cooled Airplane Engine Designed by Capt. Brewer, P. M. Heldt. Automotive Industries, vol. 58, no. 14, Apr. 7, 1928, pp. 556–557, 1 fig. New 9-cylinder power plant has piston displacement of 630 cu. in. and develops 164 hp. at 1800 r.p.m.; weight with all accessories is 445 lb.; cylinders and head are integral, and cooling fins are cast on; novel method of securing cylinders to crankcase; crankshaft made in halves; aluminum-alloy pistons; rotary diffuser; only relatively small amount of oil in engine circulated at one time and not entire supply; timing pinion.

Exhaust-Pipe Tests. Exhaust Equipment Temperature Determinations, F. W. Heckert. Air Corps Information Cir., vol. 6, no. 594, Sept. 15, 1927, 7 pp., 5 figs. Investigation of actual exhaust-pipe temperatures prevailing in flight and on ground; by means of potentiometer temperature recorder in pilot's cockpit; data obtained from aluminum stacks and standard steel exhaust equipment; built-up short aluminum finned stacks used; showed better insurance against fire hazard; highest temperatures recorded from steel whirl-chamber type exhaust manifold.

Oil Engines. The Performance of Several Combustion Chambers Designed for Aircraft Oil Engines, W. F. Joachim and C. Kemper. Nat. Advisory Committee for Aeronautics—Report, no. 282, 1928, 12 pp., 13 figs. Investigations of single-cylinder test engines to determine performance characteristics of four types of combustion chamber; increase in specific power output of high-speed aircraft oil engine depends upon ability to obtain higher mean effective pressures and improvements in mechanical efficiency of engine; best performance with bulb-type combustion chamber designed to give high degree of turbulence.

AIRPLANE PROPELLERS

Design. Propeller Data for Performance Estimates, E. M. Bertran. Aero Digest, vol. 12, nos. 3 and 4, Mar. and Apr. 1928, pp. 346–348 and 465 and 514–516 and 704, 13 figs. Mar.: Estimating combination of different propellers and engines with view to fairly accurate estimate of power available of airplane in different conditions of flight; computing horsepower available for full-throttle flight, at sea level. Apr.: Flight at sea level with motor throttled; horsepower delivered by motor at given r.p.m. decreases with altitude.

Variable-Pitch. The Variable-Pitch Airscrew, H. S. Hele-Shaw and T. E. Beacham. Engineering (Lond.), vol. 125, no. 3249, Apr. 20, 1928, pp. 489–491, 10 figs. Points out theoretical advantages of being able to vary pitch of airscrew and considers what progress has been made in solution of difficult problem; manually operated and power-operated gears. Paper read before Roy. Aeronautical Soc. See also Engineer (Lond.), vol. 145, no. 3771, Apr. 20, 1928, pp. 432–433, including brief discussion.

New British Variable Pitch Propeller, H. S. Hele-Shaw and T. E. Beacham. Automotive Indus., vol. 58, no. 19, May 12, 1928, p. 722. New automatic variable-pitch propeller for airplanes; pitch of blades varied by means of double-acting hydraulic piston operated by oil pressure from variable-stroke pump driven by engine; pump stroke controlled by governor; whatever air conditions may be pitch sets itself so as to keep angine running at constant predetermined speed; speed altered by pilot within certain limits. Abstract of paper presented to Roy. Aeronautical Soc. of Great Britain.

Variable Pitch Propellers, H. L. Milner. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 459, Apr. 1928, 12 pp., 4 figs. Gloster Hele-Shaw Beacham variable-pitch propeller described; entirely automatic in its action but pilot can vary r.p.m. by control wheel or lever; mechanism has complete control over speed; pitch will adjust itself simultaneously with throttle so that r.p.m. would not wander very far from normal value corresponding to pilot's setting.

AIRPLANES

Autogiro. The Cierva Autogiro, H. M. Yeatman. Aero Digest, vol. 12, no. 4, Apr. 1928, pp. 580–582, 3 figs. Fixed supporting surfaces of normal airplane are replaced by freely rotating windmill or rotor mounted on nearly vertical fixed axis; behavior in flight and stability; starting; standard Avro fuselage; rotor hub; central-skid spit-axle undercarriage; oleo and compression rubber legs; Wolseley Viper engine of 200 hp. driving 8-ft. 6-in. diameter tractor screw direct.

Metal, Construction of. Duralumin All-Metal Airplane Construction, W. B. Stout. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, pp. 430–432 and (discussion) 432–436. Structural members fashioned from sheet duralumin rather than from tubes; for compression loads, duralumin has great deal more strength for given weight than steel; cannot be used for compression members in combination with steel in tension members; damaged parts repaired readily; built-up sections of metal riveted together give warning of coming failure; exterior protection against corrosion.

Methods of Building Metal Airplane Structures, C. W. Hall. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, pp. 426–430, 5 figs. Parts of blanked and pressed metal made directly by machine in complete units ready for final assembly; methods followed by Hall-Aluminum Aircraft Corp. in forming members, building frames and assembling; making flanged-tube sections for truss chords; members secured together by riveting; high ratio of strength to weight obtained; cost of production lower; use by Navy; lightness of wing and aileron structures.

Safety Devices. Safety Devices for Aircraft, M. L. Bramson. Royal Aeronautical Soc.—Jl. (Lond.), vol. 32, no. 208, Apr. 1928, pp. 247–255 and (discussion) 255–263. Analysis of flying dangers; classification of accidents; Rohrbach device; de Havilland differential aileron control; Savage-Bramson anti-stall gear; Handley-Page slot; three distinct dangers with engine failure; structural failure; collision; Reid turn indicator; weather dangers; wireless direction finding; stalling as weather risk.

Stress Analysis. Stress Analysis of Commercial Aircraft, A. Klemin and G. F. Titterton. Aviation, vol. 24, nos. 15, 16, 17, 18 and 19, Apr. 9, 16, 23, 30 and May 7, 1928, pp. 890–891 and 896–899, 5 figs., 974 and 1034–42, 3 figs., 1148–64, 5 figs., 1244–50, 6 figs., and 1314–1320, 6 figs. Apr. 9: Materials of construction; aircraft steel used almost exclusively for fuselage, wing struts, and chassis; mild carbon, nickel, and chrome molybdenum steels popular; ductility important in airplane work; sheet, bar, tube and wire used; computing allowable stress in steel or duralumin columns; use of column charts; welding tubes weakens them considerably; allowable strength; combined torsion and bending. Apr. 16: Exposed struts of streamlined steel tubes for fast planes and streamlined duralumin tubes for transport planes; engine mounts of steel and rest of fuselage of duralumin; spars of externally braced thin wings of spruce or simple duralumin sections; deep internally braced wings of trussed metal spars; wing ribs of spruce or duralumin; metal propellers—duralumin for large transport planes and steel for fast planes. Apr. 23: Wing

Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

analysis; required weights estimated closely; Gap/Chord ratio; stagger between two biplane wings; location of wing spars; center of pressure location; load factors; ration of chord to beam components; high and low incidence; Department of Commerce and Army and Navy advice; effective span; application of rules to non-conventional designs; application of chord loads to internal wing truss. Apr. 30: Wing-stress analysis; wings of conventional semi-cantilever monoplane designed and analyzed; for high-incidence condition only; beam loading; loads on wings; distribution of loads between spars; computations of moments, shears and reactions; bending moments and reactions on spars; length and components of wing struts; nose-dive condition; loads in drag truss; and explanation of truss. May 7: Precise formulas derived to determine bending stress at point of equilibrium; analysis of wing beams by precise method; spar properties; determination of maximum moment in span; point of inflection; wing beams should be designed just strong enough to take bending and compressive loads at each point along span; calculations of moments.

Wings, Slotted. The "Slotted Moth." Flight (Lond.), vol. 20, no. 12, Mar. 22, 1928, pp. 195–197, 4 figs. Four separate flights, each made with object of showing some particular function of slotted-wing machine; demonstration of stalling machine from about 200 ft., without any power to flatten out; vertical rate of descent, 9 ft. per second; Moth appeared to descend in series of steps; under-carriage itself was entirely undamaged but fuselage gave way; automatic slots greatly reduced seriousness of mistakes in piloting. See also Aeroplane, vol. 34, no. 12, pp. 388, 390.

AIRSHIPS

Rigid (R-101). Developments in Rigid-Airship Construction, V. C. Richmond. Engineering (Lond.), vol. 125, no. 3248, Apr. 13, 1928, pp. 457–459, 6 figs.; and Engineer, vol. 145, no. 3770, Apr. 13, 1928, pp. 410–412, and (discussion) 398 and 340, 13 figs. partly on p. 399. Discusses design of R-101, being constructed by Air Ministry at Cardington; there are 15 main longitudinal girders, each equilateral triangle, located entirely on outside of transverse frames; airship has no keel, and no intermediate transverse frames; outstanding problem is that of providing much stronger girders of greater span than used hitherto. Paper read before Instn. Naval Architects.

Zeppelin. Zeppelin Airship LZ 127 (Zeppelin-Langstrecken-Verkehrs-Luftschiff LZ 127). Zeit. fuer Flugtechnik u. Motorluftschiffahrt (Munich), vol. 19, no. 3, Feb. 14, 1928, pp. 67–69, 5 figs. Particulars of Zeppelin being constructed at Friedrichshafen for transatlantic service; photographs show hull, engine gondolas and transverse ring in process of assembly; ship has nominal volume of 3,700,000 cu. ft.; length 770 ft.; diameter of 100 ft; to be driven by five reversible 530-hp. Maybach engines running either on gaseous or liquid fuel, and is to develop Maximum velocity of 80 m.p.h. with traveling velocity of 68 m.p.h.

ALLOY STEELS

Automotive Industry. Alloy Steels and Their Uses, B. Egeberg. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, p. 484. Suitability for automotive purposes considered; automotive industry is especially interested in alloys containing up to 5 per cent of nickel and up to approximately 1.5 per cent of chromium, with carbon content ranging from 0.10 to 0.50 per cent; results of increasing nickel content; corrosive agents with which alloy steel will come into contact.

ALUMINUM

Welding. Welding of Aluminum (Bemerkenswertes ueber die Aluminiumschweissverfahren und ihre technische Bedeutung), H. Holler. Autogene Metallbearbeitung (Halle, Germany), vol. 21, nos. 4 and 5, Feb. 15, and Mar. 1, 1928, pp. 46–54 and 66–70, 30 figs. Description of methods used in welding aluminum plates, pipes, vessels, etc.; microstructure of aluminum welds; study of hammer-welded joints of aluminum.

ASH HANDLING

Hydraulic System. Removing Molten Ash by Hydro-Jet System, D. H. Scranton. Power, vol. 67, no. 18, May 1, 1928, pp. 754–757, 7 figs. Among innovations in connection with installation of pulverized-fuel-burning boilers at C. R. Huntley Station of Buffalo General Elec. Co., is Hydro-Jet system of ash removal applied to disposal of molten ash, where comparatively low-fusion-ash coals are being burned.

AUTOMOBILE ENGINES

Anti-Knock Coating. New Anti-Knock Compound "Painted" on Combustion Chamber Walls, P. M. Heldt. Automotive Industries, vol. 38, no. 16, Apr. 21, 1928, pp. 630–631. Chemical reaction to absorb heat at moment of explosion, and restore it during expansion period, is obtained by coat of lead oxide in process known as Kalmiting; practical test of effectiveness of coating made with Chrysler car; coating combustion-chamber wall slightly reduces volume of chamber and raises compression; in high compression engines effect of coating claimed to raise compression pressure about 5 lb. per sq. in.

Oil Cooling. European Cars Now Being Fitted with Oil-Cooling Systems, W. F. Bradley. Automotive Industries, vol. 58, no. 15, Apr. 14, 1928, p. 595, 2 figs. Peugeot and Rochet-Schneider both have radiator built into water radiator; oil consumption is reduced; under Peugeot system oil is drawn in by pump through filter and sent into radiator; second filter on radiator outlet; Rochet-Schneider engine oil-radiator set in angle of V-shaped water radiator; double pump and two independent oil circuits, one circulating oil through purifier.

AUTOMOBILE PLANTS

Germany. Production methods of the Krupp Automobile Plants (Reihenfertigung im Krupp-Kraftwagenbau), Kruppsche Monatshefte (Essen), vol. 9, Mar. 1928, pp. 25–33, 18 figs. Description of equipment and sequence of manufacturing and assembling process, arrangement of shops, etc.

Grinding Practice. Abrasive Engineering Practice in Automobile Manufacturing Plants, F. B. Jacobs. Abrasive Industry, vol. 9, nos. 4 and 5, Apr. and May, 1928, pp. 103–105, 5 figs., and 131–134, 7 figs. April: Describes number of typical surfacing operations and points out why grinding process is to be preferred to milling; surfacing both sides of cylinder head; grinding cylinder blocks; joint between connecting rod and its cap finished by grinding; finishing side of asbestos clutch facings; tops of transmission cases finished flat; tops of pistons finished. May: Appointment of grinding wheel supervisors in plants where substantial quantities of abrasives are used; wheels that have outlived their usefulness on one operation rebushed or re-turned for another job; method of salvaging wheels in several automobile plants; putting new bushing in place. Norton rebushing chuck designed to accommodate wheels from 3 to 36 in. in diameter.

Machine Tools. Single-Purpose Manufacturing, F. L. Faurote. Factory, vol. 75, no. 4, Apr. 1928, pp. 769–773, 7 figs. Machine-tool equipment in Ford plant based upon idea of one-purpose machines; standard and adapted machines and transportation and handling devices; 53,000 machine tools in Ford shops; tool-design department; new welding machines necessary; Johannson blocks made in Ford laboratory; machine-tool efficiency starts with foresight and planning, followed by accurate scheduling and routing.

AUTOMOBILES

Frames, Manufacture of. The Automatic Fabrication of Automobile Frames, J. P. Kelley. Soc. Automotive Engrs.—Jl., vol. 22, no. 5, May 1928, pp. 565–569, 5 figs. Methods of A. A. Smith Corp.; daily capacity of 7000 frames; nearly all steel comes to plant in form of strips, which are rolled to remove curvature and inspected automatically for dimensions; operations and handling are automatic except pickling, cleaning and oiling stock and inspecting assembled frame; economical use of strip steel dependent upon offsetting operation making strip conform to vertical curves of finished frame.

Gears. New Change-Speed Gear (Neuere Zahnradwechselumformer), F. G. Altmann. Motorwagen (Berlin), vol. 31, no. 7, Mar. 10, 1928, pp. 147–150, 8 figs. New designs making use of internal gearing to diminish noise and secure greater compactness of construction.

Parts, Manufacture of. Ford Uses Forged, Spun and Welded Parts for Axle Housings, J. D. Knox. Iron Trade Rev., vol. 82, no. 14 and 15, Apr. 5 and 12, 1928, pp. 875–878 and 933–936, 13 figs. Apr. 5: Fabrication of rear-axle housing, differential ring gear, fuel tank and fan blades; housing made of forged, pressed and hot-spun steel parts; welding machines for use in joining differential ring and neck. Apr. 12: Steel spun to shape between motor-driven rolls; method of working steel hot accomplished on radial rolling machine consisting of two separate motor-driven formed dies or rolls with axes placed angularly.

B

BALANCING

Rotors. The Static Balancing of Rotors, B. P. Haigh. Engineer (Lond.), vol. 145, no. 3768, Mar. 30, 1928, pp. 338–340, 9 figs. partly on p. 350. As current method of balancing by rolling rotor on rails does not appear sufficiently sensitive or reliable for many practical purposes, author considers in detail principle and mode of operation of Martin static balancing machine; variety of work that can be balanced in such machines, with beneficial results in service appears to be almost unlimited.

BEARINGS

Efficiency. Factors Governing Efficiency of Various Types of Bearings. Can. Machy. (Toronto), vol. 39, no. 8, Apr. 19, 1928, pp. 46 and 48 and 50 and 77. Notable progress made; lubricating methods; provision for adjustment; post hanger; Hyatt bearing for use with high-speed shafting; greatly increased shaft life; split pillow block; alignment and expansion; adjustable bearing; safety considered when placing bearings.

Lubrication. Lubrication and Bearing-Metal Problems in Metallurgical Works (Schmiermittel- und Lagermetallfragen im Huettenbetriebe), K. Hopfer. Stahl u. Eisen (Duesseldorf), vol. 48, no. 13, Mar. 29, 1928, pp. 408–410, 2 figs. Refers to early and more recent works on development of hydrodynamic bearing-friction theory, and discusses properties and suitability of different bearing alloys; claims that problem of bearing metal and lubricant cannot be treated separately.

Non-Metallic. Non-Metallic Bearings (Nichtmetallische Lagerschalen), Maschinenbau (Berlin), vol. 6, no. 24, Dec. 15, 1927, p. 1210. In review of new bearing materials German Committee for Economical Production (AWF) mentions besides rubber and wooden bearings, new type of bearing in which carrying material is of horny character; this material is pressed on to steel backings; it is said to be resistant to acids, pressure and heat, not to break or spall and to be elastic. See brief translated abstract in Automotive Abstracts, vol. 6, no. 4, Apr. 20, 1928, p. 117.

Sliding, Friction Tests of. Friction Tests of Sliding Bearings (Reibungsversuch am Gleitlager), G. Duffing. V.D.I. Zeit. (Berlin), vol. 72, no. 15, Apr. 14, 1928, pp. 495–499, 26 figs. Description of testing apparatus; results of tests with liquid and semi-liquid lubricants; effect of roughness of sliding surfaces, of variation of viscosity with pressure and of nature of lubricant and sliding surface.

BLAST FURNACES

Theory of Operation. A New Theory of the Blast-Furnace Process (Eine neue Theorie des Hochofenverfahrens), F. Wuest. Stahl u. Eisen (Duesseldorf), vol. 48, no. 16, Apr. 19, 1928, pp. 505–506. Author presents his theory involving following statements: in front of every blast-furnace tuyere there is oxidation chamber which has injurious effect on efficiency of blast-furnace operation; any means which would reduce oxidation zone would give better operating results; etc.

BLOWERS

Turbo, Large. Brown Boveri Turbo-Blowers in Large Steel Works, R. Gilly. Brown Boveri Rev. (Baden, Switzerland), vol. 15, no. 4, Apr. 1928, pp. 134–142, 7 figs. Description of steel works of Ebbw Vale Iron and Coal Co., England; new steel-works turbo-blower working as pure exhaust-steam turbine; mixed-pressure turbine and as pure live-steam turbine; control apparatus for turbo-blower; regulation of mixed-pressure turbine; safety devices; automatic devices for preventing pumping on turbo-blower; remote control; range of regulation. (Concluded.)

BOILER FURNACES

Air Preheating. Calculation of Temperature Conditions in Boiler Plants with Air Preheating (Berechnung der Temperaturverhaeltnisse in Kesselanlagen mit Luftvorwaermung), W. Hojer. Feuerungstechnik (Leipzig), vol. 16, no. 7, Apr. 1, 1928, pp. 76–78. Discusses heat distribution in boilers; development of heat-balance equation in boilers with air preheating; gives example of its application by determination of flue-gas temperatures in boiler; derivation of heat-balance equation for boilers with air and water preheating.

Gas-Producer Boiler. The Wollaston Producer Boiler, J. Roberts. Colliery Eng. (Lond.), vol. 5, no. 50, Apr. 1928, pp. 158–160, 5 figs. That coke breeze can be economically applied for steam raising is being demonstrated on novel lines by Wollaston Gas Producers, Ltd., Manchester, coke being used in producer for generating producer gas, which is burned direct in combustion chambers of vertical or horizontal boilers, without loss of sensible heat of gas; there are two Wollaston-Cochran boilers used for heating extensive shops at depot; they are located directly above producer itself, whole forming complete unit; advantage of producer furnace.

Improvements. Progress in Burning Coal,

A. G. Christie. Power, vol. 67, no. 15, Apr. 10, 1928, pp. 658–660, 1 fig. Recent progress may be credited to following influences; increased furnace size and better combustion; increased furnace temperatures; better appreciation of radiant heat transfer and of equipment and furnace requirements for various coals; improvements in stoker design and in powdered-coal systems; better instruments and improved furnace control. Abstract of address before Philadelphia Sec., A.S.M.E.

Pulverized-Coal. A New Method of Firing Boilers With Pulverized Coal Without Furnace (Neue Kohlenstaubfeuerung fuer Flammrohrkessel ohne Brennkammer), K. Jaroschek. Braunkohle (Halle a-S. Ger.), vol. 27, no. 12, Mar. 24, 1928, pp. 221–224, 1 fig. Theory and practical method of new system of firing Lancashire boilers with pulverized lignite; tests showing efficiency of 76.7 per cent; adapting this system to firing with other pulverized coals.

BOILERS

High-Pressure. Developments in High-Pressure Boilers, D. S. Jacobus. Engrs. Soc. West. Penn.—Proc., vol. 43, no. 9, Dec. 1927, pp. 398–408 and discussion 409–416, 13 figs. One of boilers at Crawford Ave. station of Commonwealth Edison Co., Chicago; 650 lb. gage; Babcock and Wilcox boiler for 1200-lb. working pressure installed at Edgar station of Edison Electric Illum. Co. of Boston; Stirling boiler constructed for 1390 lb. working pressure at Lake-side plant of Milwaukee Electric Ry. and Light Co.; drumless boiler and its furnace.

A 400-lb. Pressure Boiler Steam Drum. Engineer (Lond.), vol. 145, no. 3772, Apr. 27, 1928, p. 460, 1 fig. Details of steam drum for land boiler, recently completed at works of Yarrow and Co., Glasgow; drum has length of 30 ft. 6 in., with internal diam. of 50-in., and it is forged in one piece, thickness of shell being $2^1/_2$ in.

High-Pressure (Benson). The Benson Process of Generating High-Pressure Steam (Das Benson-Verfahren zur Erzeugung von Hochdruckdampf), Gleichmann. Waerme (Berlin), vol. 51, no. 4, Jan. 28, 1928, pp. 55–57, 2 figs. Results of experience with actual examples of Benson plants; details of plants at Siemens-Schuckert Works which produces 60,000 lb. of steam per hr. at pressure of 180 atmos. and temperature of 425 deg. cent.; characterized by almost complete absence of refractory brickwork burner for pulverized fuel is arranged at top end of furnace.

High-Pressure (Schmidt). Schmidt High-Pressure Indirectly Heated Boiler (Der Schmidt-Hochdruck-Sicherheitskessel mit mittelbarer Beheizung und seine besondere Eignung fuer Industriezwecke), O. H. Hartmann. Waerme (Berlin), vol. 51, no. 4, Jan. 28, 1928, pp. 58–63, 10 figs. Experimental boiler built for working pressure of 60 atmos. has been in service for 2000 hours, including one continuous period of 600 hours; with grate area of 1.5 sq. m. and hand firing, it is capable of delivering up to 1960 kg. of steam per hr. See brief translated abstract in Eng. and Boiler House Rev. (Lond.), vol. 41, no. 10, Apr. 1928, pp. 504 and 513.

Klingenberg Plant, Berlin. The Boiler Plant, F. Muenziger. Eng. Progress (Berlin), vol. 9, no. 3, Mar. 1928, pp. 72–79, 13 figs. Details of boilers and boiler-house equipment at Klingenberg station, Berlin, Germany; design of boilers worked out by A.E.G., on which tenders were based; system where boilers, economizers, and air preheaters are arranged one above other was especially recommended; boiler heating surface, inclusive of cooling surface of combustion chamber was fixed at 18,850 sq. ft.; preparation and pulverizing of coal.

Locomotive. See LOCOMOTIVE BOILERS.

Waste-Heat. Steam Generation—Waste Heat Boilers—Reduction of Steelworks Costs, J. Adamson and F. Jones. World Power (Lond.), vol. 9, no. 11, Mar. 1928, pp. 167–176, 7 figs. Effect of high-gas-velocity theories on design of modern boilers; modern waste-heat boilers; flame-tube boiler; installation of waste-heat plant; economies possible with various furnaces; construction of fire-tube waste-heat boilers and maintenance; economic aspect; value of equivalent coal saved; typical balance sheets for waste-heat boiler installations in steel works. Abstract of paper read before Instn. Mech. Engrs.

The Utilisation of Waste-Heat from Large Gas Engines, Industrial Furnaces and Producers. Demag News (Duisburg), vol. 2, no. 2, Apr. 1928, pp. 31–37, 15 figs. Smoke-tube waste-heat boilers used in combination with industrial furnaces; producers with steam jackets; interpolating waste-heat boiler between cooler scourer and producer; making use of heat of water-gas producers for generation of steam as well; diagram of water-gas producer plant with waste-heat utilization.

[See also PRESSURE VESSELS.]

BOLTS AND NUTS

Manufacture. Unique Methods Feature Steel Co.'s Bolt and Nut Plant, D. M. Duncan. Can. Machy. (Toronto), vol. 39, no. 7, Apr. 5, 1928, pp. 27–30, 7 figs. Hot-forged track bolts; heating raw steel bar; in one operation bolt is measured, cut, and neck and head completely formed; roll-threading machines; hot forging dies; mechanical riddling; bolt and nut assembly.

BORING

Temperature Effect vs. Accuracy. Effect of Temperature on Bored Holes. Machy. (Lond.), vol. 32, no. 808, Apr. 5, 1928, p. 22. Effect of variations in temperature on accuracy of work; as machining progresses, casting becomes heated by work of cutting tool; if, in machining, proper attention is paid to elements of clamping, temperature and order of machine work, it will be unnecessary to season castings or forgings that have been properly annealed or allowed to cool slowly.

C

CASE-HARDENING

Principles. Facts and Principles Concerning Steel and Heat Treatment. Am. Soc. Steel Treating—Trans., vol. 13, no. 5, May 1928, pp. 848–880, 16 figs. Second series of articles on case-hardening; explains mechanism of carburizing and effect of different heat treatments following it; carburizing is due to solution of carbon into steel from some carburizing gas; decarburizing may take place during carburizing; effect of five different heat treatments after carburizing.

CAST IRON

Graphitization. Graphite in Gray Cast Iron and Its Influence on Strength (Beitraege zur Kenntnis des Graphits im grauen Gusseisen und seines Einflusses auf die Festigkeit), P. Bardenheuer and K. L. Zeyen. Stahl u. Eisen (Duesseldorf), vol. 48, no. 16, Apr. 19, 1928, pp. 515–519, 59 figs. partly on supp. sheets. Investigation of influence of overheating temperature on dissolution of graphite, on structure and graphite formation; relation of mechanical properties of cast iron to formation of graphite; influence of casting temperature on graphitization and strength of cast iron.

Pearlitic. Present Status of Pearlitic Iron, R. Moldenke. Iron Age, vol. 121, no. 18, May 3, 1928, pp. 1241. Pearlitic iron is similar to high-test irons; pearlite is grouping of alternate layers of pure iron and iron carbide; pearlitic iron falls in low-silicon ranges; silicon content and mold temperature chief factors involved; expert practical manipulation is required to get satisfactory results; pearlitic cast iron should only be made with separate melting installation and in special building.

CASTING

Centrifugal. Intricate Spun-Sorbitic Castings, J. E. Hurst. Iron Age, vol. 121, no. 15, Apr. 12, 1928, pp. 1007–1008, 2 figs. Produced in Great Britain by new process; have high strength, machinability and wear resistance; useful for engine cylinders and pistons of all kinds; desirable structure to resist wear; larger and more intricate castings may be made.

Permanent-Mold. Vacuum Principle Is Applied to Permanent Mold Casting, E. Bremer. Foundry, vol. 56, no. 7, Apr. 1, 1928, pp. 256–259, 6 figs. Process developed from practices in molding and forming glass; operations consist essentially of opening vacuum line, dipping ingress of mold into molten metal, allowing proper time for solidification, opening mold and ejecting finished casting, cooling mild, smoking joints to make proper seal for vacuum, brushing out soot, and closing and clamping; control movement.

CHAIN

Wrought-Iron. The Failure of Wrought Iron Chain, H. J. Gough and A. J. Murphy. Engineer (Lond.), vol. 145, no. 3772, Apr. 27, 1928, pp. 468–470, 9 figs. Failures and characteristics of overheated wrought iron; failures due to welds; effect of repeated static straining; wrought iron chains drawn from service; brittleness produced in new chain links and chain iron by repeated small impacts; conclusions from results of research. Abstract of paper red before Instn. Mech. Engrs.

CHROMIUM STEEL

Welding. Welding Chrome Irons and Steels. Iron Age, vol. 121, no. 18, May 3, 1928, pp. 1242–1244, 3 figs. It is necessary to prepare clean joint, use proper flux and strictly neutral flame of minimum dimensions, ending with properly adjusted heat treatment; heat treatment of welded joints; cutlery steels infrequently welded; rustless chrome-nickel irons give ductile welds; extra high chromium induces brittleness; castings should be welded hot.

COAL

Carbonization. The Economics of Carbonization at Electric Central Stations, R. P. Soule. Combustion, vol. 18, no. 4, Apr. 1928, pp. 237–243 and 260. Important carbonization products are coke, gas, and tar; B.t.u. in form of gas is worth more to central station than B.t.u. in form of solid fuel, because of reduction in size of furnace and boiler, more complete combustion, and more automatic control; in discussing cost of carbonizing coal, distinguish between fixed charges and operating expense; conclusions reached in analysis of economics of carbonization at electric central stations is summarized.

[See also PULVERIZED COAL.]

COAL HANDLING

Power Plants. Coaling Boiler Plants and Reloading Coal with Crabs for Hinged Buckets. Demag News (Duisburg), no. 1, Jan. 1928, pp. 10–11, 5 figs. Crab designed both for coaling with buckets or by grab; equipped with driver's cab and crab transversing gear; load capacity of hoisting ropes 11 tons; height of lift 72 ft.; working velocities of crab are 65 ft. 8 in. per min. for hoisting and 246 ft. 3 in. per min. for crab traversing.

CONVEYORS

Assembly. Assembly Conveyors, E. J. Tournier. Indus. Eng., vol. 86, no. 4, Apr. 1928, pp. 191–193, 8 figs. Conveyors cut cost of foods as well as Fords; handling automobile steering column rods; conveyors used in baking bread; conveyance of vegetables; roller-chain conveyor in cannery; materials-handling equipment in chain-store system; conveying equipment to handle grapes.

Gravity, Box-Counting Device. Box-Counting Device for Gravity Conveyors, P. T. Van Bibber. Indus. Eng., vol. 86, no. 4, Apr. 1928, pp. 189–190, 4 figs. Device will tally day's run without further checking; gravity-conveyor line is broken and lowered, so that there is drop of about 1 in.; additional device wholly for electrically operated counters at remote point; diameters of wheels are proportioned so that highest box lifts them both slightly clear of two push-buttons.

CRANES

Gasoline. "American" Three-Speed Gasoline Crane with Automotive Shift. Power, vol. 67, no. 17, Apr. 24, 1928, pp. 740–741, 1 fig. Flexibility equal to that of steam cranes is outstanding feature claimed for new crane, made by Am. Hoist & Derrick Co.; it has automotive shift that works like transmission on automobile.

CUTTING TOOLS

Hard Fiber. Tools and Speeds for Cutting Hard Fiber, F. H. Colvin. Am. Mach., vol. 68, no. 16, Apr. 19, 1928, pp. 655, 1 fig. Machinery fiber at Spaulding Co.; saws run about 3300 r.p.m. for 12 to 14-in. saws; turning speeds of from 600 to 800 ft. per min.; threading at same speed as for brass; material punched and drawn or extruded; best materials to use for tools in cutting fiber.

D

DIES

Precision Indexing. Precision Indexing Die. Machy. (Lond.), vol. 31, no. 807, Mar. 29, 1928, pp. 836–838, 2 figs. Dies for production of blade with ten small holes; distance between pairs of holes and angle between each pair held to limits of plus or minus 2 min.; indexing die maintained these basic requirements by producing single pair of holes at each stroke of press, blade being pivoted on large central hole while mounted on swinging arm indexed to five punching stations.

DIESEL ENGINES

Automotive. High-Speed Automotive Diesel Engines, W. Riehm. Soc. Automotive Engrs.—Jl., vol. 22, no. 5, May 1928, pp. 523–531, 12 figs. Higher pressures of Diesel cycle necessitate only inconsiderable increase in engine weight, not interfering with use for automotive purposes; M.A.N. has adopted pressure-atomization method which is particularly adapted to use in automotive engines; construction of earlier and recent M.A.N. oil engines with details of fuel injection

and control; economy and flexibility make it competitor of gasoline engine for vehicle propulsion especially where fuel cost is major item.

Combustion Chambers. Diesel Engine Air-Fuel Mixture Improved by New Methods, F. E. Bielefeld. Automotive Industries, vol. 58, no. 16, Apr. 21, 1928, pp. 632–633, 3 figs. Oil injected in such manner as to form "fog net" in neck of combustion chamber and air is driven through this by auxiliary piston, resulting in rapid burning; combustion chamber of entirely different shape; divided into three sections; speed of injection of very finely atomized fuel oil and speed of turbulence of air of combustion are substituted for propagation.

Double-Acting (Hesselman). First 6000 B.H.P. A.E.G. Double-Acting Engine. Mar. Engr. and Motorship Bldr. (Lond.), vol. 51, no. 608, Apr. 1928, pp. 133–134, 5 figs. 6-Cylinder 2-stroke-cycle Hesselman engine completed for 13$^1/_2$-knot, 10,000-ton d.w. single-screw cargo liner, building by Deutsche Werft, Hamburg, for Hamburg-Amerika line.

Experimental. Experimental Diesel Engines, A. Turner. Engineering (Lond.), vol. 125, nos. 3247 and 3248, Apr. 6 and 13, 1928, pp. 425–427 and 462–464, 12 figs. Discusses recent developments that have taken place at Admiralty Engineering Laboratory at West Drayton; types of engines used for study. Apr. 13: Mechanical efficiency; effect on cylinder liner wear has not been at all marked; combustion processes are much more readily carried out in 4-stroke than in 2-stroke engines. Paper read before Instn. Naval Architects. See also Shipbldg. and Shipg. Rec. (Lond.), vol. 31, no. 14, Apr. 5, 1928, pp. 391–392, 5 figs.

Fulton. The Fulton En Bloc Diesel. Oil Engine Power, vol. 6, no. 5, May 1928, pp. 330–336, 18 figs. Detailed description of new type of engines brought out by Fulton Iron Works Co.; four-stroke, single-acting trunk-piston, air-injection type; sizes ranging from 300 to 2000 b.hp., with two cylinder sizes; en bloc frame totally encloses working parts; cast-iron bearing shell omitted and heavy babbitt shells rest directly in bedplate; connecting-rod design; larger engines have water-cooled piston tops; water-cooled exhaust valve heads, as well as cages used on larger engines; governor gear; lubricating system.

Marine (Sulzer). 7000-B.H.P. Marine Diesel Engine. Engineering (Lond.), vol. 125, no. 3247, Apr. 6, 1928, pp. 412–413, 5 figs. (1 on p. 416). Details of Sulzer engine built to order of Stoomvaart Maatschappij Nederland; among distinguishing features are method of scavenging and charging through double row of ports in cylinder liner, upper ports, communicating with scavenge-air receiver, being fitted with automatic valves. See also description in Engineer (Lond.), vol. 145, no. 3769, Apr. 6, 1928, p. 375, 1 fig.

Supercharging. Experimental Study of the Buechi Process of Supercharging Diesel Engines (Leistungsversuche an einem Dieselmotor mit Buechischer Aufladung), A. Stodola. V.D.I. Zeit. (Berlin), vol. 72, no. 13, Mar. 31, 1928, pp. 421–428, 20 figs. Study of process of supercharging Diesel engines by means of turbo-blower operated by gas turbine utilizing exhaust gases of engine; process effects increase of 50 per cent in average capacity and 100 per cent in maximum capacity of Diesel engine, without changing combustion or exhaust temperatures.

The Buchi System of Supercharging. Shipbuilder (Lond.), vol. 35, no. 212, Apr. 1928, pp. 238–240, 5 figs. Outstanding features of system are high degree of supercharge utilized and employment of blower directly driven by exhaust-gas turbine; tests were conducted on 6-cylinder, 4-stroke-cycle engine; Diesel engines with Buchi exhaust-turbo charging built or in course of construction.

DRILLING MACHINES

Raboma. Economic Metal Drilling (Wirtschaftliches Bohren), P. Popendicker. Schiffbau (Berlin), vol. 29, no. 6, Mar. 14, 1928, pp. 109–115, 11 figs. Construction and operation of Raboma drills and multiple drilling units; selection of proper drills, their maintenance, cost of operation, time studies.

E

ECONOMIZERS

Combined with Air Heaters. Fuel Economizing Appliances (The Galloway "Supermiser"). Machy. Market (Lond.), no. 1428, Mar. 16, 1928, pp. 245–246, 4 figs. Supermiser combines in one apparatus of simple and compact design, and in effective manner, functions and advantages of both economizer and air heater; use of pairs of concentric tubes, flue gases passing through annular space between inner and outer tubes, while water and air to be heated pass in opposite direction through inner tubes and over outer surface of water tubes respectively; hot gases part with their heat to water and to air simultaneously. See also description in Eng. & Boiler House Rev., vol. 41, no. 9, Mar. 1928, pp. 432 and 434, 2 figs.

High-Pressure. Exhaust-Gas Feedwater Preheaters and Air Heaters for Modern High-Pressure Boilers (Die Bedeutung des Abgasspeisewasservorwaermers und des Lufterhitzers fuer den neuzeitlichen Hochdruckkessel), K. Burwick. Waerme (Berlin), vol. 51, no. 4, Jan. 28, 1928, pp. 64–67, 12 figs. Discusses introduction of more effective and cheaper economizers; connection and calculation of economizer; types; shows scheme of boiler with economizer and air heater, examples of modern economizer installations.

Flue Gas Economizers for High-Pressure Boilers, H. F. Lichte. Eng. and Boiler House Rec. (Lond.), vol. 41, no. 9, Mar. 1928, pp. 446–447. For boilers, working at 25 atmos. and higher pressures, entirely new type of economizer is required; new German rules require economizer to be tested at 1.3 times boiler pressure plus 10 atmos.; describes Stierle economizer, novelty and superiority of which is claimed to lie in use of square ribs forming continuous closed channels. Abstracted from Waerme, Jan. 7, 1928, p. 3.

ELECTRIC FURNACES

High-Frequency. Steels Made Under New Conditions, F. Wever and H. Neuhauss. Iron Age, vol. 121, no. 16, Apr. 19, 1928, pp. 1073–1075, 6 figs. Results of German tests with high-frequency induction furnace; carbonless, carbon and alloy steels show unusual properties; future possibilities; refining accelerated; steel bath, under normal refining slag, brought from 0.14 per cent carbon to 0.03 per cent in 2 minutes; carbonless steel made in high-frequency furnace. Abstract of paper published in Proceedings of Kaiser Wilhelm Institute for Iron Research.

Iron-Founding. Making Cast Iron in the Electric Furnace, C. E. Williams and C. E. Sims. Franklin Inst.—Jl., vol. 205, no. 4, Apr. 1928, pp. 575–577. Investigation completed by Bureau of Mines; involved year's successful operation of jobbing foundry making miscellaneous gray-iron castings from steel scrap.

Rotating-Arc. The Demag Revolving Electric Furnace. Foundry Trade Jl. (Lond.), vol. 38, no. 607, Apr. 5, 1928, p. 239, 1 fig. Details of simple revolving-arc furnaces of interest to non-ferrous founders; specially adapted for melting copper, zinc, tin and lead alloys and high-grade gray cast iron; advantages claimed; as compared with melting in coke, gas or oil-fired crucibles and reverberatory furnaces.

ELECTRIC LOCOMOTIVES

Combined Battery and Trolley. Combination Switching Locomotive Meets Unusual Requirements. Elec. Ry. Jl., vol. 71, no. 13, Mar. 31, 1928, pp. 530–532, 3 figs. Locomotive of New York Central uses either battery charged by oil-engine generator, or external power from overhead or third rail; 300-hp. engine connected direct to 200-kw. generator arranged for charging battery; storage battery of 218 cells; equipped with four GE-286,600-volt d.c. single-geared commutating-pole motors; develops tractive effort of 34,000 lb.; engine is constant-speed type; has direct fuel injection.

France. 5400-H.P. Electric Locomotives, Paris, Lyons and Mediterranean Railway. Ry. Engr. (Lond.), vol. 49, no. 579, Apr. 1928, p. 138, 1 fig. Locomotives are 4–6–6–4 type; provided with Oerlikon individual drive; each of six driving axles is driven by twin motor with pressure of 1350 volts at constant line; each develops 800 hp. at 45 m.p.h.; maximum speed, 80 m.p.h.; weight of locomotive, 153 tons.

ELECTRIC WELDING

Aluminum. Welding Aluminum and Its Alloys, W. M. Dunlap. Iron Trade Rev., vol. 82, no. 17, Apr. 26, 1928, pp. 1066–1068 and 1116, 6 figs. Allowance for higher speed of welding and for greater expansion and contraction distinguishes aluminum welding from that of steel; finishing important; flux to dissolve aluminum oxide so that coalescence may occur; selection of welding rod; avoiding contraction strains when welding duralumin; filling holes in welding castings; removing flux. Abstract from paper presented before Am. Welding Soc.

Gas Pipe Lines. High Pressure Natural Gas Line Electrically Welded 45 Miles, B. K. Smith. Oil and Gas Jl., vol. 26, no. 45, Mar. 29, 1928, pp. 119, 122 and 126, 2 figs. Line is 7-in. pipe, pressure 1000 lb. preliminary work tested to 1250 lb.; no leak developed; equipment, 3 Lincoln stable arc engine-driven welders; each weld in two layers to avoid pinholes; each joint stamped with number of operator, bonus for good work; piecework on last 15 miles; in 11,000 joints only 14 pinholes found and readily sealed.

Waterwheel Casing. Reclaiming a Cast-Iron Waterwheel Casing, C. W. Babcock. Am. Welding Soc.—Jl., vol. 7, no. 3, Mar. 1928, pp. 19–22, 3 figs. Because of extreme thinness of iron inside radius of worn section it was impossible to weld, or deposit metal, on casing itself; space bridged by series of steel rings welded together and to casing, and then remaining area welded in; high spots ground off welded section by portable grinding wheel.

F

FLOW IN PIPES

Viscous Liquids. The Flow of Viscous Liquids Through Pipes. Engineering (Lond.), vol. 125, no. 250, Apr. 27, 1928, pp. 498–499, 3 figs. Oils of various degrees of viscosity are frequently pumped through pipes to ships or to distant storage tanks; to determine power required in given case and to choose most economical pumping plants and pipes, frictional resistance encountered by liquids when so transported must be known; presents formula and charts by C. H. Lee for determining viscous or turbulent flow, and describes method of using them.

FLUIDS

Friction of Rotating Disks. Study of Friction of Disks Rotating in a Viscous Fluid (Etude sur le frottement des disques en rotation dans en fluide visqueux), C. Hanocq. Revue Universelle des Mines (Liège), vol. 18, no. 1, Apr. 1, 1928, pp. 8–28, 14 figs. Analysis of experiments and determination of coefficients of formulas and application to efficiency of pump or turbine; verification of curves obtained from centrifugal pump, pumping viscous liquids.

FOUNDRIES

Steel, Progress in. Hot Blast, Powdered Coal in Cupolas. Iron Age, vol. 121, no. 15, Apr. 12, 1928, pp. 1027–1028. Phases of recent advance of science in foundry considered; rapid changes affecting steel foundries; marked progress in sand-testing devices; late method for measuring permeability; methods that have been used effectively in Wilson Foundry; experience with hot blast and powdered coal; alloys for high-strength castings. Review of Detroit Chapter meeting of Am. Soc. Steel Treating.

FUELS

[See COAL; PULVERIZED COAL.]

FURNACES

Annealing, Circular. Circular Annealing Furnace Produces Good Results, J. Strauss. Foundry, vol. 56, no. 8, Apr. 15, 1928, pp. 299–300 and 303, 6 figs. Furnace erected in steel-foundry department, U. S. Naval Gun factory; one-piece roof, 26 ft. in diam. overall and weighing about 25 tons; outlets for products of combustion arranged to permit close temperature control; burners supplied with fuel oil; flue construction; improvements secured from construction.

Forging—Gas Fired. Designs Special Gas-fired Furnace to Heat Stock for Upsetting, R. C. Gorseau. Iron Trade Rev., vol. 82, no. 19, May 10, 1928, pp. 1204–1205, 2 figs. Unit features over and under firing from top and front; first cost is low and repairs prove economical; refractory life high; furnace designs for heating of tubular stock for upsetter, as well as heating nickel steel bar stock for upsetter work; representative operations on solid bar stock shown in tables.

G

GAGES

Screw-Thread, Manufacture of. Manufacture of Thread Gages (Die Herstellungsgenauigkeit der Gewindelehren und ihre Messtechnische erfuellung), G. Berndt. Werkstattstechnik (Berlin), vol. 22, no. 5, Mar. 1, 1928, pp. 131–136, 5 figs. Describes special microscopes, gages and measuring devices; methods used in making thread gages in accordance with German (DIN) standards.

GEAR-CUTTING MACHINES

Helical-Gear. A Large Double Helical Gear

Generating Machine. Engineer (Lond.), vol. 145, no. 3772, Apr. 27, 1928, pp. 462–468, 10 figs. (partly on p. 462). Built on Sykes principle; designed to cut turbine and other gear wheels up to 9 ft. 6 in. in diam. and 30 in. wide; it can be set to cut not only double-helical, but also single-helical gearing.

GEARS

Helical. The Accuracy of Large Hob-Cut Helical Gears, G. A. Tomlinson. Engineering (Lond.), vol. 125, no. 3249, Apr. 20, 1928, pp. 465–466, 6 figs. Results of investigation made at National Physical Laboratory into errors likely to occur in process of hobbing large helical gears; errors fall under three heads: errors inherent in hobbing process, errors produced in gear by errors present in hob, and errors caused by certain errors in hobbing machine.

Noise Elimination. Eliminating Noise in High-Speed Gearing, I. Short. Power, vol. 67, no. 18, May 1, 1928, pp. 761–764, 2 figs. Adjustable resonating "stethoscope" tells number of clicks per revolution of gear; hobber noise can be avoided by perfecting hobbing machine; contact noise is reduced by designing gear with proper relation of pitch and face width; gear noise due to pump pulsations may be cured by proper couplings.

Phenolic Laminated. Laminated Phenolic Gears Show Safety Factor of 15 to 20, P. M. Heldt. Automotive Industries, vol. 58, no. 17, Apr. 28, 1928, pp. 654–657. Brief review of meeting of American Gear Mfgrs. Assn.; report of E. Buckingham relating to tests made on pinions; factor of safety of gears made of laminated phenolic materials, instead of being between three and four is actually between 15 and 20; other papers; keyway standards; gear-tooth profile modification; effect of resilience; gear lubrication; rear-axle lubrication; tooth contact in worm gears.

Reduction. The Rieseler Hydro-Mechanical Reduction Gear. Engineering (Lond.), vol. 125, no. 3248, Apr. 13, 1928, pp. 444–445, 10 figs. Details of combined hydraulic and mechanical change-speed gear invented by H. Rieseler, Hamburg, Germany; though this is primarily intended for use on motor vehicles of all kinds, it also has potentialities for more general application; gearing was submitted to exhaustive series of tests by Weisshaar and Kelling, of Hamburg.

Sprockets, Hobbing. The Hobbing of Chain Wheels, B. S. Clevely. Machy. (Lond.), vol. 32, no. 809, Apr. 12, 1928, pp. 41–45, 9 figs. Cutting of chain wheels on hobbing machines, and first principles involved; for roller chain tooth, slight variation in flank accuracy is not important; for inverted tooth chain, angle must be as accurate as possible, and flank of teeth must be flat; in this case universal hob may be ruled as being out of question; opinion expressed that for high-speed chain transmissions hobbing is somewhat doubtful proposition.

GRINDING

Non-Metallic Materials. Grinding Non-Metallic Materials. Am. Mach., vol. 68, no. 15, Apr. 12, 1928, p. 610, 3 figs. Three halftones illustrating methods of grinding non-metallic materials, each cut accompanied by brief description; battery of three double-head grinding machines facing six sides of insulating bricks; grinding hexagon floor-tile to tolerance of 0.007 in. of squareness; china syrup-jars being ground on four sides to make tight-fitting surfaces.

H

HEAT INSULATION

Thickness. Calculation of Most Economic Insulation Thickness (Berechnung der wirtschaftlichsten Isolierdicken), E. Borschke. Archiv. fuer Waermewirtschaft (Berlin), vol. 9, no. 4, Apr. 1928, pp. 117–120, 8 figs. Mathematical analysis, based on theory of heat transfer and using method of maxima and minima, for determination of most economic thickness of heat insulation.

HIGH-SPEED STEEL

Cutting. Tests in Machining Manganese Steel, A. S. Martin. Heat Treating and Forging, vol. 14, no. 3, Mar. 1928, pp. 282 and 296. High-speed tool steel has been found effective in machining material hitherto practically unmachineable; other applications suggested; cutting operations; with tools made of steel under test, manganese steel can be commercially machined using cutting speeds from $7^1/_2$ to 15 ft. per min. with depths of cuts up to $^3/_{32}$ in. and feeds of $^1/_{60}$ in. to $^1/_{30}$ in.

Testing. Discussion of paper by J. B. Mudge and F. E. Cooney Entitled, "Evaluating Quality in Heat Treated High Speed Steel by Means of Milling Cutter," G. C. Davis. Am. Soc. Steel Treating—Trans., vol. 13, no. 5, May 1928, pp. 881–883. Discussion of paper published in Feb. 1928, issue of Transactions. Presents table showing number of hours of service obtained from milling cutters hardened by means of salt bath.

HUMIDITY

Psychrometric Chart. Revised Psychrometric Chart Assists High Temperature Design, I. Lavine and R. L. Sutherland. Chem. and Met. Eng., vol. 35, no. 4, Apr. 1928, pp. 224–228. Properly constructed humidity chart is found especially valuable in making air calculations such as in design of drying apparatus; in connection with experimental work in drying lignite, it was deemed advisable to construct high temperature psychometric chart along conventional lines; chart represents mixtures of dry air and water vapor, total pressure of mixture being taken as 29.92 in. of mercury.

HYDRAULIC CYLINDERS

Design. Hydraulic Cylinder, H. S. Cattermole. Machy. (Lond.), vol. 32, no. 810, Apr. 19, 1928, pp. 88–89. Permissible working pressures and stresses in hydraulic cylinders; quality of metal usually ascertained by transverse, tensile, or compression test; Admiralty requirements; malleable cast iron; steel and semi-steel castings; steel forgings; gun-metal bronze; phosphor bronze; working stress must be considerably lower than breaking stress.

HYDRAULIC PRESSES

Forging. Hydraulic Forging Presses (Die hydraulichen Schmiedepresseinrichtungen), A. Deutsch. Foerdertechnik u. Frachtverkehr (Wittenberg), vol. 21, no. 5, Mar. 2, 1928, pp. 95–99, 9 figs. Details of construction, pumps, valves, etc.; materials of construction and mode of operation; commercial types by Haniel & Lueg and others.

Rapid-Production. The Most Rapid Hydraulic Press in the World (La presse hydraulique la plus rapide du monde). Revue des Matériaux de Construction et de Travaux Publics (Paris), no. 222, Mar. 1928, p. 117, 1 fig. New hydraulic press of French make gives 20,000 compressions in 8 hours; assembly of several presses which turn around fixed axis.

HYDRAULIC TURBINES

Axial-Flow. Flow of Water in the Casing of an Axial Flow Turbine, K. Kanesige. Soc. Mech. Engrs. of Japan—Jl. (Tokio), vol. 31, no. 131, Mar. 1928, pp. 71–104, 25 figs. Flow of water in free whirling chamber of head casing for axial-flow turbine treated as irrotational and symmetrical with respect to vertical axis of central core rotating with constant angular velocity; ratio of radius of central core to that of circular exit of casing expressed as function of direction of flow determined by guide vanes and ratio of height of casing cover above circular exit to its radius.

High-Head (Francis). High-Head Spiral Turbines in Styria and Mexico (Die Hochdruck-Spiralturbinen der Anlagen Arnstein in Steiermark und Tepexic in Mexiko), G. von Troeltsch. V.D.I. Zeit. (Berlin), vol. 72, no. 15, Apr. 14, 1928, pp. 491–494, 7 figs. Describes horizontal-shaft Francis turbines, by J. M. Voith of Heidenheim, installed in Teigitsch plant, at Arnstein, Austria (head, 246 m., capacity, 21,300 hp.) and at Tepexic plant, on Necaxa river, Mexico (head, 210 m., capacity, 15,200 hp.); acceptance tests; Allen chemical gaging apparatus used.

Pelton. On the Inclination of the Ridge of Buckets on a Pelton Wheel, K. Shongenji. Kyushu Imperial Univ., College of Eng.—Memoirs (Fukuoka, Japan), vol. 4, no. 7, 1927, pp. 339–351, 14 figs. Pelton wheel tested with 22 and 26 buckets; angle of inclination of ridge of buckets varied for several different values; maximum efficiency attained for wheel with certain values of angle of inclination.

Propeller. Kaplan and Propeller Turbines (Kaplan-und Propellerturbinen), H. Pfieger-Haertel. Elektrotechnische Zeit. (Berlin), vol. 49, no. 13, Mar. 29, 1928, pp. 496–499, 10 figs. Installation of Kaplan and propeller turbines; examples of vertical and horizontal-shaft Kaplan turbines up to 4400 hp. capacity at 15 m. head.

I

INDUSTRIAL MANAGEMENT

Cost Control. Basic Data for Setting Standard Costs, H. J. Bock. Mfg. Industries, vol. 15, no. 3, Mar. 1928, pp. 191–193. Prerequisites are thorough account classification and tie-up between cost records and general ledger; burden standards and department budgets help greatly in reducing costs with foremen's cooperation.

Inventory Budget. Production and Inventory Budgets, T. R. Jones. Am. Mach., vol. 68, no. 14, Apr. 5, 1928, p. 587. Proper background for production budget is supplied by sales-expectancy estimate; three classes of burden; triple classification of expense together with reduction of burden charges to dollars per labor-hour basis, permits quick adjustment of budget to production in event of unforeseen business fluctuation; inventory analysis.

Motion Study. Motion Studies (Bewegungsstudien), F. Hahn. Stahl u. Eisen (Duesseldorf), vol. 48, no. 12, Mar. 22, 1928, pp. 361–368, 13 figs. Notes on Gilbreth system; examples of system, including reference to its application in correspondence department of Macy's department store, New York; simple stereocamera; film studies; physical studies of motions, as exemplified in laboratory of Lillian M. Gilbreth; application of motion study to iron and steel industry.

Production Budget. Production and Inventory Budgets, T. R. Jones, Am. Mach., vol. 68, no. 14, Apr. 5, 1928, p. 587. Proper background for production budget is supplied by sales-expectancy estimate; three classes of burden; triple classification of expense together with reduction of burden charges to dollars per labor-hour basis, permits quick adjustment of budget to production in event of unforeseen business fluctuation; inventory analysis.

Production Control. General Principles of Mass Production, F. W. Burstall. Machy. (Lond.), vol. 32, no. 809, Apr. 12, 1928, pp. 54–57 and (discussion) 57–58. Single- and multi-purpose tools; antiquation factor in machine tools; jig as necessary evil; production and preparation of material; position of foundry; pressings and stampings; factory layout; economy of idle machines; high-grade goods by multiple not mass production; elasticity of transport and finance.

Replacement Policy. When Is Equipment Scrapped and How Is Its Value Charged Off? L. P. Alford. Mfg. Industries, vol. 15, nos. 3 and 4, Mar. and Apr. 1928, pp. 199–202 and 279–282, 2 figs. Mar.: Replacement policies vary among manufacturing concerns while methods of charging off generally agree. Apr.: Survey of 91 large and successful companies in wide variety of industries shows that selection and purchasing are executive responsibilities.

Small Plants. Making a Profit in the Small Plant, W. B. Pavey. Mfg. Industries, vol. 15, no. 3, Mar. 1928, pp. 187–190, 4 figs. Describes management methods that have met with unusual success; advantages of small plant; necessity of research.

Time Study. Smoothing the Wrinkles from Management, Time Study the Tool, S. E. Thompson. Taylor Soc.—Bul., vol. 13, no. 2, Apr. 1928, pp. 69–80 and (discussion) 80–86, 4 figs. Presents fundamental principles and practical method of using time studies in various functions of business and shows specifically the place in industry of time measurement and job analysis as tool of management; fixing time standards in shoe shop; time standards in production control; rules for time study.

INDUSTRIAL TRUCKS

Electric. Intraplant Handling Economies. Soc. Automotive Engrs.—Jl., vol. 22, no. 4, Apr. 1928, p. 475, 2 figs. Power trucks effect large man-power saving; special uses of lift trucks; industrial truck moves eight times load of handtrucker at thrice speed, with theoretical ratio of saving of 24 to 1. Excerpts from Profitable Application of Electric Industrial Trucks and Tractors in Industry, issued by Soc. for Elec. Development.

The Application of the Electric Truck to Material-Handling in the Foundry, H. J. Dorus and C. S. Schroeder. Am. Foundrymen's Assn.—Reprint, no. 28-12, for mtg. May 14, 1928, pp. 171–190, 12 figs. Describes operation of industrial electric truck in typical small foundry; taking raw material to storage; charging cupola, carrying molten metal, general foundry refuse, finished molds, etc.

Materials Handling With. $33^1/_3$% More Output for $59,000 Less Labor Cost by Better Handling, E. D. Smith and T. A. Keefer. Mfg. Industries, vol. 15, no. 4, Apr. 1928, pp. 253–257 10 figs. Methods and equipment of National Cash Register Co.; in 10,000 sq. ft. less floor space, and with 76 per cent fewer trucks, processing time is reduced 66 per cent, inventory is cut 80 per cent and number of handlings is reduced from 58 to 20; handling material from and to stock; clean air supplied to enameling room.

INTERNAL-COMBUSTION ENGINES

[See AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES.]

J

JOURNALS

Design. The Design of Sliding Neck Journals (Zur Berechnung von Gleittragzapfen), E. Wellner. V.D.I. Zeit. (Berlin), vol. 72, no. 13, Mar. 31, 1928, pp. 435–440, 7 figs. On basis of Reynolds theory and Guembel studies, author analyzes conditions of sliding journal friction and works out curves for design of elements of sliding-neck journals, also curves for maximum unit surface pressure for various speeds of revolution.

L

LATHES

Manufacture. Mass Manufacture of Lathes, B. Finney. Iron Age, vol. 121, no. 16, Apr. 19, 1928, pp. 1067–1072, 10 figs. Production-control system, routing and mechanical handling, and special-purpose equipment reduce costs at Monarch Machine Tool Co.; raw materials needs estimated on basis of pending business; work tag and move card; cost record of all subassemblies; monorail and lift trucks; drilling holes in lathe beds while resting on small flat cars; toolroom system.

LOCOMOTIVE BOILERS

Design. The Design and Proportion of Locomotive Boilers and Superheaters, C. A. Brandt. Can. Ry. Club—Proc. (Montreal), vol. 27, no. 2, Feb. 1928, pp. 20–58 and (discussion) 58–64, 32 figs. Boiler and superheater relation to cylinder efficiency and capacity; steam consumption; high steam pressures; water-tube firebox; grate area and furnace volume; length of flues for proper efficiency; results obtained with engines fitted with type "E" superheater; feedwater heaters; effect on boiler evaporating capacity.

Nickel-Steel. Nickel Steel for Locomotive Boilers, C. McKnight. Ry. Mech. Engr., vol. 102, no. 4, Apr. 1928, pp. 193–198, 7 figs. Possesses high strength and ductility: physical properties at high temperatures and after aging superior to carbon steel; 3 per cent nickel-steel boiler plate of 70,000 lb. per sq. in. minimum tensile strength; comparison of nickel and carbon-steel plates; high temperature characteristics of nickel steel; uniformity; manufacture; possibility of higher strengths with nickel steels; boiler tubes and staybolts. Paper presented before Am. Soc. for Steel Treating.

LOCOMOTIVE REPAIR SHOPS

Equipment. Special Fixtures for Railroad-Shop Work, F. H. Colvin. Am. Mach., vol. 68, no. 17, Apr. 26, 1928, pp. 687–688, 5 figs. Devices for smoke box and boiler work at Delaware & Hudson Colonie Shops; fixture for drilling smokebox rings and boiler fronts for smoke boxes; specially shaped clamp to hold boiler front on table of less diameter; fixtures holding long string of shoes or wedges planed at once; laying out driving boxes for machining.

LOCOMOTIVE TERMINALS

Cincinnati, Ohio. Cincinnati Engine Terminal; Big Four Railway. Eng. News-Rec., vol. 100, no. 15, Apr. 12, 1928, pp. 581–584, 5 figs. Steel and creosoted timber framing for buildings; concrete platform for washing engines; ashpits of water-filled type; layout and facilities; general layout; coal and water supply; ashpits washing platform; turntable; roundhouse; engine pits; repair shop and storeroom.

LOCOMOTIVES

Canadian National Railways. 4-8-4 Type Locomotives for the Canadian National Railways. Engineering (Lond.), vol. 125, no. 3245, Mar. 23, 1928, pp. 347–348, 13 figs. partly on supp. plate and p. 354. Intended for handling either fast freight or passenger service and for long runs over two or three divisions; all engines are designed to take boosters.

Diesel. Geared Diesel and Diesel-Electric Locomotive Trials, N. Dobrowolski. Engineering (Lond.), vol. 125, no. 3250, Apr. 27, 1928, p. 504. Information regarding geared Diesel locomotive of 4-8-2 type built by Firma Hohenzollern A.-G. of Duesseldorf, for use in Russia; result of trials of similar train journeys, Moscow—Baku—Moscow, with Diesel-Electric locomotive, and geared Diesel locomotive. Abstract translated from V.D.I. Zeit., June 18, 1928, p. 873.

Diesel-Electric. Speed Regulation of Diesel-Electric Locomotives (Die Steuerung Dieselelektrischer Lokomotiven), M. Sueberkrueb. V.D.I. Zeit. (Berlin), vol. 72, no. 17, Apr. 28, 1928, pp. 557–562, 8 figs. General principles of speed regulation on basis of constant and variable r.p.m.; details of systems patented by Forges et Ateliers de Constructions Électriques de Jeumont of Paris, General Electric Co. and Lemp system of Allgemeine Elektrizitaets Gesselschaft; commends last mentioned as best.

Electric. See ELECTRIC LOCOMOTIVES.

Gasoline-Electric. Mack Develops Line of Gas-Electric Railcars and Locomotives. Automotive Industries, vol. 58, no. 14, Apr. 7, 1928, pp. 544–548, 6 figs. Numerous original features embodied in design; system of control similar to that of steam engines; new method of cooling; car seats 75; use of more than single power plant; engine is 6-cylinder one, of 5-in. bore and 6-in. stroke, with single inlet and exhaust valve and single spark-plug per cylinder; reason for larger generator; battery for starting; engine is protected against high temperature; long compressor life.

Oil-Electric. Performance Records of Oil-Engine Locomotives, H. Lemp. Power, vol. 67, no. 18, May 1, 1928, pp. 784–785, 1 fig. Reviews experiences of last three years; oil-electric locomotive is only locomotive on standard-gage tracks that has any service records to offer in United States; used exclusively for switching purposes; passenger and main-line freight service is to be inaugurated by N. Y. Central on Putnam Division; in Europe, main-line operation is considered satisfactory; oil locomotives with mechanical transmission. Abstract of paper read before Metropolitan Sec., Am. Soc. Mech. Engrs.

Pulverized-Coal-Burning. Locomotives Fired by Coal Dust, D. W. Kleinmow. Colliery Guardian (Lond.), vol. 136, no. 3509, Mar. 30, 1928, p. 1237, 2 figs. Best results achieved with lignite dust, which contains high percentage of volatile constituents; fuel utilized better than in grate firing, as less than half excess air is required to heat; in one boiler, saving over 20 per cent; new type of A.E.G. dust-fired locomotive represents efficiency of 67.5 per cent; saving of fuel as compared with gratefired boiler is 23 per cent. Abstract from Braunkohle.

Locomotive Experiments in Germany. Ry. Engr. (Lond.), vol. 49, no. 580, May 1928, pp. 175–179, 10 figs. First locomotive to burn pulverized fuel successfully, constructed by A.E.G. of Berlin, has given satisfactory test results on German railways; tender of locomotive was specially equipped for carrying and feeding pulverized fuel to firebox; main characteristics of firebox described; advantages secured by system summarized.

Steam-Turbine (Ljungström). Tests of Ljungström Turbine Locomotives (Essais de locomotives à turbines Ljungström). Revue Générale des Chemins de Fer (Paris), vol. 47, no. 4, Apr. 1928, pp. 312–314, 1 fig. Test results on turbine locomotive in Sweden and in Argentina; tests of comparison with piston locomotives.

Three-Cylinder. New Three-Cylinder Locomotives of the N. Y., N. H. and H. R. R. Ry. and Locomotive Eng., vol. 41, no. 3, Mar. 1928, pp. 61–62, 1 fig. 4-8-2 type engines equipped with McClellon fireboxes, Bean cast-steel smoke-boxes and cast-steel cylinders; engines develop tractive force of 71,000 lb.; 265 lb. pressure is used.

LUBRICATION

Theory and Practice. The Theory and Practice of Lubrication, J. E. Southcombe. Machy. Market (Lond.), no. 1429 and 1430, Mar. 23 and 30, 1928, pp. 265–266 and 287–288, 6 figs. Mar. 23: Comprehensive theory of friction and lubrication for use in application of lubricants and design of bearing surfaces; theory of boundary lubrication; oiliness is property of interface. Mar. 30: Experimental work done; rotational motion at slow speed; machine for comparing lubricating value of oils; reciprocating motion and pistons; boundary friction; disturbing action of water. Paper read before North-East Coast Instn. Engrs. and Shipbldrs.

M

MACHINING METHODS

Shock Absorbers. Tooling That Is Unusual, F. H. Colvin. Am. Mach., vol. 68, no. 16, Apr. 19, 1928, pp. 657–660, 12 figs. Methods used in making Houde hydraulic shock absorbers; use of dial indicators on turret lathes; swaging splined holes to taper; body of reservoir of shock absorber contains two stationary abutments and has two moving wings; boring tools; cutting slot for abutments; finishing ends of movable wings on grinder; drilling holes in wing shaft; broaching splined holes.

MACHINE TOOLS

Stop Mechanism. The "Beaver-Tail" Stop, E. V. Crane. Machy. (Lond.), vol. 32, no. 808, Apr. 5, 1928, pp. 9–12, 6 figs. Stop mechanism used to prevent or minimize inertia shock or impact at some point in repeated cycle where clutch is thrown or tools are brought into contact with each other or with work; application to power presses; size of driven gear; profile of beaver-tail cam; beaver-tail cam without dwell.

MALLEABLE CASTINGS

Annealing. Anneal Each Heat Independently, B. Finney. Iron Age, vol. 121, no. 18, May 3, 1928, pp. 1209–1213, 5 figs. System of single-heat annealing installed by Southern Malleable Iron Co.; by close temperature control during annealing process, combined carbon reduced to 0.03 per cent; annealing cycle for castings from each heat is scheduled after analysis of iron has been made; ovens charged from above; treatment of castings after heat; charges made up mechanically; special vent board features molding; avoiding excessive handling of cores; plant can make own power in emergency.

MATERIALS HANDLING

Foundries. Determining Returns from Materials Handling Equipment, J. J. Hartley. Am. Foundrymen's Assn.—Reprint no. 28-18, for mtg. May 14, 1928, pp. 281–286. Various computations have been made showing that it is necessary to handle or rehandle from 150 to 200 tons of material to produce one ton of castings in average foundry; it is evident that materials handling is major item of foundry cost; most startling economies can and have been made in shops doing repetitive work called continuous-process foundries.

METALS

Compression Testing. Plastic Compression, E. Siebel. Metallurgist (supp. to Engineer, Lond.), Apr. 27, 1928, pp. 57–58. Study of phenomena of flow under compression; in compression testing, difficulties are encountered, owing to tendency of ductile test pieces of requisite short length to assume barrel shape, while non-ductile test pieces fail by rupture along double shear cone; methods used should make it possible to study in detail exact flow which occurs in any given type of plastic deformation.

Corrosion. Corrosion of Metals, G. D. Bengough. Iron and Coal Trades Rev. (Lond.), vol. 116, no. 3134, Mar. 23, 1928, p. 425. Standard test should be acceleration test; should be easily reproducible in two different laboratories, sufficiently simple to form part of ordinary works laboratory's routine, and readily interpretable in terms of conditions of practice; chief factors relative to corrosion; only hope of obtaining standard test is research work of more accurate type than usually published in technical journals. Abstract from paper read before Inst. of Metals.

Machinability. Machinability of Metals, O. W. Boston. Univ. of Mich., Dept. of Eng. Research, no. 2, Feb. 1928, 38 pp. and (discussion) 38–47, 30 figs. Methods used to designate machinability; measurement of force on tool; measurement of power or energy required to remove given chip; ability of standardized tool to cut; measurement of finish left; penetration of standardized drill; torque developed by drill; cutting speed for certain tool life; hardness numbers; measurement of heat generated and hardness induced. Paper presented at Am. Soc. Steel Treating.

Pickling. Practical Features of Pickling, W. G. Imhoff. Iron Trade Rev., vol. 82, nos. 15 and 17, Apr. 12 and 26, 1928, pp. 943–945 and 978, 1 fig., and 1069–1071, 3 figs. Apr. 12: Design of pickling departments; steel beams, girders, sashes, pipes and rafters; sewers, drains and sump; brick or concrete floors; pickling-tank setting; extremely important to allow plenty of room; black storage area; actual working area; finishing section; steam water and air lines painted; removing fumes. Apr. 26: Further design details of pickling departments; sheets pickled with radial arm machine stacked in rack and held open by pins; wire pickling done by radial arm machine, in groups or nests of oval tanks; three methods of pickling pipe; handling black plate; advantages of continuous pickling.

Surface Hardening of. New Process of Surface Hardening of Metals. The Cloud Burst Process (Un nouveau procédé de durcissement superficiel des métaux). Pratique des Industries Mecaniques (Paris), vol. 11, no. 1, Apr. 1928, pp. 23–26, 9 figs. Not a chemical process but based on surface hardness from repeated blows; describes process and method of controlling hardness.

P

PAINTING

Mechanical—Mass Production. Mechanical Painting Processes Used in Mass Production (Anstreichverfahren im Grossbetrieb), H. Hettner. Werkstattstechnik (Berlin), vol. 22, no. 6, Mar. 15, 1928, pp. 167–171, 8 figs. Describes processes used in painting, varnishing, lacquering of grass mowers, motorcycles, iron bedsteads, automobile bodies, etc.

PIPE

Cast-Iron, Manufacture. New Method of Making Cast Pipe. Iron Age, vol. 121, no. 15, Apr. 12, 1928, pp. 999–1003, 6 figs. Hand labor eliminated in McWane mechanical process; unique multiple-lip ladle pours metal; ladles equipped with 14 spouts; two 6-in. or two 8-in. pipes poured at same time; conveyors and cranes handle materials; plant scheduled like rolling mill; features of continuous operation and flexibility of output; sand handling all done by conveyors; molds and cores handled by cranes.

Wrought, Manufacture of. Bethlehem's New Pipe Mills, G. A. Richardson. Iron Age, vol. 121, no. 16, Apr. 19, 1928, pp. 1084–1089, 7 figs. Sparrows Point plant turns out wide range of butt and lapweld product; materials move minimum distances; pipe-mill layout; automatic operation of gas-producer unit; elimination of water dip for galvanized pipe; welding rolls driven by 400-hp. electric motor; driven roller conveyors for handling pipe from operation to operation in lap-weld mills and control system.

PIPE LINES

Calculations. The Next Size Larger, J. Blansjaar. Heating and Vent. Mag., vol. 25, no. 4, Apr. 1928, pp. 76–79 and 81–82, 3 figs. Points out uselessness of calculating exact pipe diameters when pipes of calculated sizes are not available; principles involved in water heating; principal causes of resistance to flow of steam or water; figuring typical installation; chart for figuring pipe diameters based on Brabbee friction tables; how to use curves; point of divergence between European and American practice.

Welding. See ELECTRIC WELDING, Pipe Lines.

PLATES

Flat, Stresses in. The Stresses in Flat Plates, H. H. Gorrie. Rensselaer Polytechnic Inst.—Eng. and Science Series, Apr. 1928, pp. 20–60, 29 figs. Results of investigation to determine variation in intensity of strains that occur in flat steel plates subjected to uniform loads, to determine actual principal axes of strain for various points on plate, and by actual measurement, and from theoretical considerations, to find strain along these axes. Bibliography.

Rectangular, Theory of. The Design of Rectangular Plates with Concentrated Loading at Any Point and Bending Test of a Square Plate (Berechnung rechteckiger Platten unter Wirkung konzentrierter Belastung an beliebiger Stelle und Biegungsversuch mit quadratischer Platte), T. Inada. College of Engineering—Memoirs (Fukuoka, Japan), vol. 4, no. 7, 1927, pp. 353–392, 8 figs. Mathematical theory of rectangular plates; theory checked by bending test of square plate of ingot steel 900 × 900 × 10 mm.

POWER PLANTS

Oil-Engined. Heavy-Oil Engines in Power Stations. Engineering (Lond.), vol. 125, no. 3250, Apr. 27, 1928, p. 514. Editorial remarks on place of heavy-oil engines in power generation; in one important respect, for dealing with peak loads, Diesel engines have advantage of being able to start up almost instantaneously; refers to work of Diesel Engine Users' Assn. and Prime Movers' Committee of National Electric Light Assn.

Steam, High-Pressure. High-Pressure Steam Generation by Superheated Steam (Hochdruckdampferzeigung durch ueberhitzten Dampf), S. Leoffler. Waerme (Berlin), vol. 51, no. 4, Jan. 28, 1928, pp. 52–54, 5 figs. Details of trial plant erected at Vienna Locomotive Works according to author's system; operates according to so-called indirect process of evaporation, distinguished by water in boiler proper not being heated by flue gases, but by superheated steam; larger plant equipped with Bruenn high-pressure turbine, is being erected at Witkowitz Iron Works in Moravia; German Rys. Co. have ordered locomotive to operate on this principle.

Story of First Commercial 1,200-Lb. Steam Plant, I. E. Moultrop. Power, vol. 67, no. 17, Apr. 24, 1928, pp. 712–718, 8 figs. Why this pressure was chosen; operating experiences at Edgar Station, Boston; results that have justified decision; regenerative cycle made 1200 lb. worth while; why live-steam heater was not used. Abstract of paper read before Eng. Inst. of Canada and Philadelphia Sec. A.S.M.E.

Steam-Electric, Baltimore. Baltimore's New Station, A. S. Loizeaux. Elec. World, vol. 91, no. 18, May 5, 1928, pp. 901–906, 6 figs. At new Gould Street plant of Consolidated Gas, Electric Light and Power Co. one boiler is used per turbine; low-voltage auxiliaries; automatic equipment employed; coal-handling facilities; generator cooling; welding piping used. Abstract of paper read before regional mtg. of Am. Inst. Elec. Engrs.

Design and Operation of Gould Street Plant. Power, vol. 67, no. 17, Apr. 24, 1928, pp. 742–743, 2 figs. Steam plant designed to secure maximum reliability with low cost per kw-hr. output has been built for $130.05 per kw. for first 36,000-kw. unit; when plant is completed with four such units cost will drop to $88.26 per kw.

Operating Experiences at Gould Street Station, A. L. Penniman, Jr. and F. W. Quarles. Elec. World, vol. 91, no. 18, May 5, 1928, pp. 909–913, 4 figs. Performance obtained during initial operation of new station of Consolidated Gas, Electric Light and Power Co. of Baltimore and methods adopted to overcome usual preliminary troubles.

Steam-Electric, Berlin, Germany. The Klingenberg Super Power Station (Berlin, Germany), M. Rehmer. Eng. Progress (Berlin), vol. 9, no. 3, Mar. 1928, pp. 57–58, 2 figs. At present peak load of 130,000 kw., following machines and station equipment are in operation: main turbine sets working at 72 per cent of their rated load, 9 boilers, 5 coal-pulverizing mills; station can be proclaimed as one of most economical producers of electrical energy, having energy consumption of only 15,600 B.t.u. per kw-hr. of gross production.

Steam-Electric, Detroit, Mich. The Trenton Channel station of the Detroit Edison Company. Engineering (Lond.), vol. 125, no. 3248, Apr. 13, 1928, pp. 433–437, 16 figs. (partly on p. 448 and suppl. plate). Details of pulverized-fuel-preparation plant.

PREFERRED NUMBERS

Wage-Rate Application. American System of Preferred Numbers. Mfg. Industries, vol. 15, no. 3, Mar. 1928, p. 232–233. Working Committee of Am. Eng. Standards Committee, after period of study, recommended adoption of system based on German practice, reason being its simplicity of detail; application in development of wage scales; presents table of preferred numbers informally approved by Committee.

PRESSURE VESSELS

Heads, Design of. Design of Unstayed Dished Heads of Pressure Vessels for Internal Pressure (Die Berechnung ankerloser gewoelbter Boeden von Druckbehaeltern auf Innendruck), E. Hoehn. Schweizerische Bauzeitung (Zurich), vol. 91, no. 10, 1928, pp. 128–131, 4 figs. Design of dished heads on basis of rise of meridian arch and on basis of stresses in spherical wall; shapes of dished heads.

Oxyacetylene Welding of. Procedure Control Methods Used in Pressure Vessel Welding, H. E. Rockefeller. Boiler Maker, vol. 28, no. 2, Feb. 1928, pp. 41–42, 1 fig. Welding head seams of high-pressure tank; methods of testing pressure vessels; providing ventilation; test of tank; regular hydrostatic test 600 lb. per sq. in.; fiber stress at test pressure was 27,000 lb. per sq. in.; discussion of factor of safety; strength of welded vessels. Paper read before Int. Acetylene Assn.

PULVERIZED COAL

Safety Regulations. Special Hazards in Pulverizing of Coal and in Firing with Pulverized Coal (Betriebsgefahren der Kohlenstaub-Aufbereitung und Kohlenstaub-Feuerung), F. Schulte. Archiv. fuer Waermewirt-schaft (Berlin), vol. 9, no. 4, Apr. 1928, pp. 107–110. Report of pulverized-coal committee of Coal Council of Germany; review of special American and German reports on fire and explosion hazards of coal pulverization and firing with pulverized coal; statistics of accidents and results of questionnaire investigation in Prussia; special instructions for producers and users of pulverized coal.

Utilization. Plant Uses Pulverized Iowa Coal, J. E. Everson. Black Diamond, vol. 80, no. 12, Mar. 24, 1928, pp. 60–61, 2 figs. Experience and considerations expressed on use of pulverized coal based on records of Sioux City Gas and Electric Co., Sioux City, Iowa; reasons for selection of pulverized coal were: greater physical overall boiler efficiency obtainable with Iowa coals, greater flexibility of operation and greater economic overall efficiency by beng able to burn successfully any of coal available at truly competitive price in wide field; since June, 1925, plant has burned coal from Iowa and 9 other states; summaries show three years' operating results.

PUMPS

Geared, Design of. The Design of Geared Pumps, E. Buckingham. Am. Mach., vol. 68, no. 15, Apr. 12, 1928, pp. 603–606, 6 figs. Limitations of conventional involute form of tooth for pumping service; helical gears of segmental tooth form are proposed and calculations of form of basic rack to generate them given; tooth action must avoid trapping; gears used successfully in gas compressors on small refrigerating units, as they operate quietly and effectively at high speeds.

PUMPS, CENTRIFUGAL

Feedwater. Boiler - Feedwater Centrifugal Pumps for High Pressure (Kesselspeise-Kreiselpumpen fuer hohen Druck), Weyland. Waerme (Berlin), vol. 51, no. 4, Jan. 28, 1928, pp. 68–71, 9 figs. Economic advantages obtained by high-temperature feedwater preheating; design of hot-water pumps for large power plants; introduction of hot condensates in high-pressure stage of feed-water pump.

Submerged. Submerged Pumps (Unterwasserpumpen), H. Sauveur. V.D.I. Zeit. (Berlin), vol. 72, no. 13, Mar. 31, 1928, pp. 441–444, 12 figs. Reviews early designs of submerged pumps, coupled to vertical axes, by Schorch, Gscheidlen and Cooper; problem of packing ring, especially in case of fluctuating water levels; details of recent models of submerged pumps, particularly Garvens type.

The "Electromersible" Pump. Elec. Rev. (Lond.), vol. 102, no. 2627, Mar. 30, 1928, p. 572, 2 figs. By utilizing motor rotor as actual water impeller, advantages are secured owing to absence of usual glands; output per pump specified at 100 tons per hour against 75-ft. head; machine consists of 3-phase squirrel-cage motor combined with centrifugal pump; stator core and windings protected; water led in by means of screw vanes at intake end, whereby rotary motion with pressure is gradually imparted to it.

R

RAILWAY MOTOR CARS

Diesel. New Design of Railroad Motor Car Equipped with Compressionless Diesel Engine (Eine neue Triebwagenbauart mit kompressorlosem Dieselmotor und ihre Versuchsergebnisse), Nolde. Organ fuer die Fortschritte des Eisenbahnwesens (Munich), vol. 83, no. 6, Mar. 16, 1928, pp. 109–112, 5 figs. General description of Wegmann railroad motor car; details of six-cylinder, 75 to 90-hp. compressionless M.A.N. Diesel engines; results of tests.

Gasoline-Electric. Gas-Electric Unit for Rail Cars. Ry. Age, vol. 84, no. 15, Apr. 14, 1928, pp. 866–870, 11 figs. Important features of gas-electric unit designed and put in service by Mack International Motor Co., Plainfield, N. J.; for use in three sizes of rail motor cars and three sizes of locomotives; construction of base; engine develops 152 b.hp. at 1800 r.p.m.; cooling system; control; electrical equipment; operating data.

Rail-Cars and Their Operation, W. C. Sanders. Soc. Automotive Engrs.—Jl., vol. 22, no. 5, May 1928, pp. 541–548 and (discussion) 548–549, 4 figs. Railroads of future will supplement through passenger trains with self-propelled local cars and motor-coaches; definite figures for savings from substituting gasoline propelled trains for steam trains; ideals of rail-car design; definite requirements for many units; maintenance organization of New Haven railroad; adequate training is required for rail-car operators.

REFRIGERATING MACHINES

Improvement. Increasing Efficiency of Refrigerating Systems, G. Hilger. Ice and Refrig., vol. 74, no. 4, Apr. 1928, pp. 403–406, 11 figs. Apparatus and methods for increasing efficiency of refrigerating machines; relationship of temperatures and pressures of working refrigerants; effect of non-condensable gases; control and regulation of evaporators; describes and illustrates various apparatus and methods which may be used to increase operating efficiency of compression refrigerating system. (To be continued.) Abstract of paper read before Nat. Assn. Practical Refrig. Engrs.

Multi-Stage. Utilization of Multi-Stage Refrigerating Machines, O. Wagner. Institut du Froid (English Edition)—Monthly Bul. (Paris), vol. 8, no. 11, Nov.-Dec. 1927, pp. 1073–1078. Discusses advantages which can be hoped for from multi-stage compression of cold vapors

and conditions under which it is convenient to choose machine with several stages; real field of utilization is that of very low temperatures. Abstract translated from Zeit. fuer die gasamte Kaelte-Industrie, Sept. 1927, p. 160.

ROLLING MILLS

Electric Drive. Electric Drives for Rolling Mills, L. A. Umansky. Mech. World (Manchester, Eng.), vol. 83, no. 2151, Mar. 23, 1928, p. 218. Recent improvements; when mill requires number of adjustable-speed drives d.c. motor drive used; only method of obtaining adjustable speed with a.c. motor of size involve in steel-mill work is to use slip-ring induction motor, and to regulate its speed by acting on its secondary circuit. From Am. Inst. Elec. Engrs.

Operation. Timken Heat Treating and Metal Working Methods Reduce Costs, F. W. Manker. Mfg. Industries, vol. 15, no. 3, Mar. 1928, pp. 217–218, 3 figs. Timken Roller Bearing Co., at its Canton plant, makes its own steel alloy in five Heroult electric furnaces which turn out 235 tons daily; steel is poured into molds and ingots, after being heated uniformly in gas-fired soaking pits, are bloomed in 35-in. 3-high blooming mill; in piercing mill red hot rods are rotated and pulled over plug which pierces hole through them longitudinally; novel method of reclaiming scrap material.

Pipe Mills. New Pipe Mills Have Novel Features, G. A. Richardson. Iron Trade Rev., vol. 82, no. 16, Apr. 19, 1928, pp. 1002–1005, 8 figs. Conveyors in lapwelding mills are motor driven; stock passes through cold straighteners without break in handling; other diversions from standard practice; Sparrows Point plant of Bethlehem Steel Co.; separate gas-producer building; skelp storage and handling; thorough inspection; hydraulic test and threading; protective coating; galvanizing department; galvanized pipe not dipped in water.

Plate Mills, Drive. New Drive for Three-High Plate Mills, J. Taylor. Iron Age, vol. 121, no. 15, Apr. 12, 1928, p. 1004, 1 fig. Driving center roll at high speed gives large torque with increased flywheel stored energy; customary pinions and pinion housing replaced by light nest of gears between flywheel and mill spindles; saving in first cost and in renewals; 75 per cent added momentary power; rolling power consumption is reduced; only mill provided with slip drive can make use of this method for operating three-high mill.

Strip, Cold-Rolling. The Cold-Rolling of Strip Steel, H. C. Uhl. Iron and Steel Engr., vol. 5, no. 4, Apr. 1928, pp. 171–177 and (discussion) 177, 12 figs. Advantage of cold rolling; uses of cold-rolled strip steel; classification as to quality and finish; preparation for rolling; trend in new mills; description of mills and method of rolling; electrical equipment for cold-rolled strip steel mills; motors and control; motor sizes required for various sizes of mills; drives for reels.

S

SAND BLASTING

Costs. The Labor and Air-Power Cost of Sand-Blasting, E. H. Stehman. Am. Ceramic Soc.—Jl., vol. 11, no. 4, Apr. 1928, pp. 227–234, 6 figs. Efficiency data are given from experience on adjustment of air and sand quantities, size and shape of nozzle from work; production data on blasting of large ware and barrel cleaning of small ware; data are shown in curves.

SAND, MOLDING

Testing. An Automatic Precision Strength Test for Sand, G. G. Brown and C. C. deWitt. Am. Foundrymen's Assn.—Reprint, no. 28-15, for mtg. May 14, 1928, pp. 235–246, 3 figs. Precision method of testing compressive strength of molding sands with accuracy of plus or minus one per cent is described; Method includes auto matic testing machine capable of precise work which can be readily adapted for making tensile or transverse tests.

SPRINGS

Coil, Rectangular-Section. The Compression Spring of Rectangular Section, G. Ashworth. Inst. Civil Engrs.—Sessional Notices (Lond.), no. 3, Mar. 1928, pp. 88–90. Deals with helical and volute spring, particularly of sizes in general use on railway rolling stock; account of investigation which determined internal distribution of shear stress and strain for overstrained circular section. Abstract.

Spiral, Dynamics of. Dynamic Properties of Spiral Springs (De dynamiska engenskaprna hos spiralfjadrar), W. Weibull. Ingeniors Vetenskaps Akademien—Handlingar (Stockholm), no. 70, 1927, 25 pp., 19 figs. Existing formulas for calculating strain in springs exposed to impact loading not satisfactory; proposes new formulas for helical springs; formulas verified by photographically registering various movements of turns of spring.

STEAM ENGINES

Heat Transmission in. Heat Transmission in Reciprocating Engine Cylinders (Der Waermeuebergang zwischen Arbeitsmittel und Zylinderwand in Kolbenmaschinen), W. Nusselt. V.D.I. Zeit. (Berlin), vol. 72, no. 6, Feb. 11, 1928, p. 172. Review of earlier investigations; facts indicated lead to conclusion that heat transmission during condensation with superheated steam is definitely less than with saturated steam; this fact clearly contradicts author's work; states that much further research is necessary to clear up many uncertain aspects on subject. See translated abstract in Mar. Engr. and Motorship Bldr. (Lond.), vol. 51, no. 608, Apr. 1928, p. 157.

STEAM TURBINES

Klingenberg Plant, Berlin. The Steam Turbine, E. A. Kraft. Eng. Progress (Berlin), vol. 9, no. 3, Mar. 1928, pp. 80–83, 7 figs. Details of turbines installed in Klingenberg station, Berlin; as result of studies made to determine best operating conditions of turbine equipment, it was found expedient to divide total output of station between three triple-expansion condensing turbine sets, each of 80,000 kw. continuous output; on each set, high-pressure and intermediate-pressure turbines are arranged in tandem driving one generator, and there are two-low-pressure turbines in tandem driving second generator.

Vibration. Curing Resonant Vibration in Turbine Units, T. C. Rathbone. Power, vol. 67, no. 15, Apr. 10, 1928, pp. 629–632, 5 figs. Methods of correcting resonance conditions when encountered in operating units; vibration reduced by changing supports; effect of change in foundation loading; floor vibrations; internal and external friction retards vibration.

Zoelly. Steam Consumption of a 12,000-Kw. Zoelly Turbine (Dampfverbrauchs-Messungen an einer 12,000 Kw. Zoelly-Dampfturbine im staedtischen Kraftwerk in Leiden, D. Dresden Schweizeizerische Bauzeitung (Zurich), vol. 91, no. 15, Apr. 14, 1928, pp. 181–183, 4 figs. Description of Zoelly steam turbine of 1750 mm. maximum diameter, installed in municipal power plant of Leyden, Holland; details of test showing steam consumption of 4.35 to 4.71 kg. per kw-hr.

STEEL

Alloy. See ALLOY STEELS.

Chromium Steel. See CHROMIUM.

Fatigue Stresses. The Fatigue-Resisting properties of 0.17 per cent Carbon Steel at Different Temperatures and at Different Mean Tensile Stresses, H. J. Tapsell. Iron and Steel Inst.—advance paper (Lond.), no. 14, May 1928, 13 pp., 4 figs. Review of behavior of mild steel under fatigue stresses over practical range of temperatures based on fatigue experiments carried out at National Physical Laboratory. See abstract in Engineering (Lond.), vol. 125, no. 3251, May 4, 1928, p. 557.

Hardening. Hardening by Reheating After Cold Working, M. A. Grossman and C. C. Snyder. Can. Machy. (Toronto), vol. 39, nos. 7 and 8, Apr. 5 and 19, 1928, pp. 38–39 and 75–76, and 33–34 and 73, 18 figs. Apr. 5: Theory explaining phenomenon of hardening of cold-worked and quenched steel by reheating at low temperatures; thin layer of interblock material, which increases gradually in thickness as reheating temperature is raised. Apr. 19: Decrease in toughness due to transformation of retained austenite to non-ductile alpha iron.

High-Speed. See HIGH-SPEED STEEL.

STEEL MANUFACTURE

Semi-Direct Method. Latest Process of Making Steel Reduces Manufacturing Cost. West. Machy. World, vol. 19, no. 3, Mar. 1928, pp. 127–128. Semi-direct method of making steel independent of coking coal and at cost of pig iron announced by American Research Corp.; first converts iron ore into sponge, which is chemically treated, then fed continuously to retort of unique design, melted and finally alloyed.

STEEL CASTINGS

Heat Treatment. A Modern Plant for the Heat Treatment of Miscellaneous Steel Castings, A. W. Lorenz. Am. Foundrymen's Assn.—Reprint, no. 28-10, for mtg. May 14, 1928, pp. 141–152, 9 figs. Describes plant, uniquely equipped for full quenching and tempering of miscellaneous steel castings; with this plant output of over 500 tons per month may be obtained, at cost of about one-half cent per pound.

Shrinkage. The Contraction of Steel Castings, Koerber and Schitzkowski. Metallurgist (supp. to Engineer, Lond.), Apr. 27, 1928, pp. 55–56. Investigation of shrinkage phenomena in castings carried out at two steel foundries in Duesseldorf district; relates not only to measurement of contraction in simple test bars but also to study of actual casting and especially of large wheels and pulleys. Abstract translated from Stahl u. Eisen, Feb. 2 and 9, 1928.

STOKERS

Chain-Grate. Measurements of Temperature and Air Flow of Traveling Grates (Temperatur- und Luftmessungen an einem Wanderrost), W. Deinlein. Zeit. des Bayerischen-Revisions-Vereins (Munich), vol. 32, nos. 4 and 5, Feb. 29 and Mar. 15, 1928, pp. 37–40, and 57–58, 13 figs. Description of apparatus and methods used in experimental study forming part of investigation of combustion in boiler furnaces, subsidized by Society of German Engineers (V.D.I.).

Roller Bearings on Chain Grate Stokers. Power Plant Eng., vol. 32, no. 9, May 1, 1928, p. 526. Tests were made at Moabit central station, Berlin, to determine how roller bearings would work under heavy service of old chain-grate stokers, how much fuel could be saved and how well lubrication with dry graphite would satisfy. Abstract translated from Archiv. fuer Waermewirtschaft.

Underfeed. Detroit Edison Company Selects Stokers for New Plant at Delray. Power, vol. 67, no. 18, May 1, 1928, pp. 788–789, 1 fig. Underfeed stokers for first six boiler units of new plant, now in course of construction; lack of ash-disposal facilities influenced decision to use stokers; experience with pulverized coal at Trenton Channel satisfactory.

T

TOLERANCES

Skoda System, Czechoslovakia. Notes on Limit Systems, N. N. Sawin. Engineering (Lond.), vol. 125, no. 3246, Mar. 30, 1928, pp. 373–375, 17 figs. Skoda Works, in Pilsen, in 1921, adopted D.I.N. system of standard hole, in which hole is made as close as may be to nominal dimension; after using this system five years, some of its difficulties and shortcomings became evident; to verify justice of these complaints, and to limit imperfections of force and wringing fits, series of experiments was carried out; author gives abstract of experiments made to check tolerances of manufactured parts.

W

WELDING

Electric. See ELECTRIC WELDING; PRESSURE VESSELS.

WIND POWER

Utilization. Electric Current from Wind. Compressed Air Mag., vol. 33, no. 4, Apr. 1928, p. 2380, 1 fig. Unique contrivance has been erected in southern California; wind motors are capable of developing 200 hp., structure is mounted on circular track base so that it may be swung in direction of wind; second plant of this kind is now in course of construction and is designed to produce 1400 hp.

WIRE ROPE

Research. Wire Ropes Research, A. W. Scoble. Engineering (Lond.), vol. 125, no. 3250, Apr. 27, 1928, pp. 522–525, 7 figs. Third report of Wire Ropes Research Committee. All specimens were of 80 to 90 tons per sq. in. tenacity, four being made of 0.021 in. and three of 0.036-in. diameter wire; ropes were made in pairs, one of which was of Lang's and other of ordinary lay; repeated bending tests; comparison of all ropes of both tensile strengths; reversed bending of ropes; experiments with single wires.

WIRE, STEEL

Cold-Rolling. Production of Steel Wire by Cold Rolling, M. v. Schwarz and G. Goldschmidt. Metallurgist (supp. to Engineer, Lond.), Apr. 27, 1928, pp. 59–60. Authors have attempted to work out process for producing wire from 5-mm. diameter rod by process of cold rolling; angular grooves or passes so proportioned that wire tends spontaneously to keep itself "erect" in pass are used; microstructure and physical properties of resulting wire are fully described.

THE ENGINEERING INDEX

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AIRPLANE ENGINES

Air Cooled. New Curtiss 12-Cylinder "Chieftain" is Largest Air-Cooled Engine, P. M. Heldt. Automotive Industries, vol. 58, no. 20, May 19, 1928, pp. 767-769, 3 figs. Hexagon-type radial power plant for airplanes; two rows of cylinders one behind other; 600 hp. at 2200 r.p.m.; piston displacement 1640 cu. in.; bore and stroke 5$^5/_8$ and 5$^1/_2$ in.; cylinder heads flat; crankshaft of 2-throw, 180-deg. type; crank-case construction; three bevel gears at rear; cooling of air-cooled cylinders; firing order; survey of range of types of engines that seemed promising.

Magnetos. New Special Light-Weight Magneto Developed by Splitdorf Engineers, E. B. Nowosielski. U. S. Air Services, vol. 13, no. 5, May 1928, p. 36, 1 fig. New special light-weight magneto Model NS-9; improved inductor type producing four equal sparks per revolution; use of aluminum alloys, lamination of coil core, coil poles, magnet poles and rotor inductors; by virtue of laminated parts eddy current dampening reduced to minimum; high-tension coil and condenser are stationary and located under arch of magnets.

Oil Coolers. The Vickers-Potts Oil Cooler. Flight (Lond.), vol. 20, no. 17, Apr. 26, 1928, p. 291, 2 figs. Unit of comparatively low aerodynamic resistance; can be placed in slipstream of airscrew; hollow fins threaded on two tubes through which oil passes on its way from engine to oil tank; alternative path for oil when starting from cold; complete weights and drag at 100 m.p.h. of various units.

Superchargers. Superchargers Are Standard on New Aircraft Engines. Aero Digest, vol. 12, no. 5, May 1928, p. 808. Superchargers especially designed by General Electric Co. will be built as standard equipment into three new types of Wright aircraft engines; maximum efficiency in operation is expected; supercharger arranged so that it can be used to maintain sea level power when flying at moderate altitudes.

The Comparative Performance of Roots Type Aircraft Engine Superchargers as Affected by Change in Impeller Speed and Displacement, M. Ware and E. E. Wilson. Nat. Advisory Committee for Aeronautics—Report, no. 284, 1928, 14 pp., 9 figs. Three sizes of Roots-type superchargers tested by N.A.C.A.; impeller lengths of 11, 8$^1/_4$ and 4 in., giving displacements of 0.509, 0.382, and 0.185 cu. ft. per impeller revolution; supercharger with short impellers used where space is limited without any considerable sacrifice in performance.

AIRPLANE PROPELLERS

Efficiency. Efficiency of Aircraft Propellers (Der Wirkungsgradbegriff beim Propeller), A. Betz. Zeit. fuer Flugtechnik und Motorluftschiffahrt (Munich), vol. 19, no. 8, Apr. 28, 1928, pp. 171-177, 12 figs. Theoretical report from Kaiser Wilhelm Institute for Research in Dynamics of Fluids, discussing difficulty of defining and determining efficiency of aircraft propellers; proposes tentative, admittedly inadequate theory.

New Type. Novel Airscrew. Times Trade and Eng. Supp. (Lond.), vol. 22, no. 514, May 12, 1928, p. 218. Brief reference to airscrew designed to make use of energy of exhaust gases from engine.

Variable Pitch. The Hele-Shaw—Beacham Variable Pitch Airscrew, Hele-Shaw and Beacham. Aeroplane (Lond.), vol. 34, no. 16, Apr. 18, 1928, p. 562, 1 fig. Also Flight (Lond.), vol. 20, no. 16, Apr. 19, 1928, pp. 265-270. Airscrew developed by Gloster Aircraft Co.; hydraulic control gear; airscrew consists of pair of metal blades mounted in two journal bearings so that blades may rotate in these bearings; spring will invariably return blades to normal pitch if hydraulic pressure fails; pilot changes r.p.m. of his engine by readjusting governor-setting lever. Abstract of paper read before Royal Aeronautical Soc.

AIRPLANES

Brakes. Braking of Airplanes When Landing (Le freinage des avions á l'atterrissage). Aéronautique (Paris), vol. 10, no. 107, Apr. 1928, pp. 116-117, 1 fig. Describes new system of braking by means of crutch attached to plane near tail; clutch is lowered to press on ground as plane glides forward.

Hydraulic Brakes for Aeroplanes. Engineer (Lond.), vol. 145, no. 3775, May 18, 1928, p. 544, 2 figs. Describes braking system employed on huge all-metal monoplane, known as "inflexible," which Wm. Beardmore and Co. have built for Air Ministry for experimental purposes; system is of Lockheed hydraulic type and is similar to that fitted to many designs of automobiles.

Giant—Design. Prospective Development of Giant Airplanes, B. Von Roemer. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 463, May 1928, 7 pp., 6 figs. Survey of latest German projects shows giant airplane is being sought; Junkers G 31, Rohrbach Rocco and Dornier Super-Wal are initial types; project J-1000 of Junkers; Rumpler seaplanes; Grulich's twin-hull high-wing monoplane; in seaplane designed by Klamt of Breslau, wing rests on three towers supported by three large hulls. From Luftfahrt, Oct. 22, 1927.

Helicopters. See HELICOPTERS.

Streamlining. Streamlining Adjustments While in Flight as Illustrated by the Behavior of Birds, J. Prentice. U. S. Air Services, vol. 13, no. 5, May 1928, pp. 25-27, 4 figs. Flow of air around airplane of today is turbulent and indicates waste of energy; shape has great deal to do about bird's efficiency in flight; studies of streamlining led to conclusion that there must be variation in shape after flight begins in order to get best results from any flying device; experiments with captured birds; experiments showed need in United States of supply of super-resilient wood for aircraft construction.

Stress Analysis. Stress Analysis of Commercial Aircraft, S. Klemin and G. F. Titterton, Aviation, vol. 24, nos. 20, 21, and 22, May 14, 21, and 28, 1928, pp. 1367 and 1404-11, 4 figs., 1455 and 1472-75, 3 figs., and 1524-25, 34 and 1536-38, 7 figs. May 14: Chassis designed for severe landing and load factor introduced to give required strength; requirements of Commerce Department; design of chassis struts; airplane wheels; shock-absorber systems; analysis of conventional semi-cantilever monoplane; unit vertical load; unit drag load; bending in axle; level landing with side load; three-point landing condition; design of struts and axle. May 21: Fuselage analysis; fuselage of welded chrome-molybdenum steel except for mild-carbon engine mount; U. S. Commerce Department requirements; high-incidence condition; maximum stabilizer and elevator load; maximum fin and rudder load; landing conditions; torque load; cabane investigations; new engine mount for existing airplane; Commerce Department procedure; load factors and tail surface loads; analysis of conventional monoplane fuselage. May 28: Fuselage analysis; fuselage truss solved graphically; maximum stabilizer and elevator load maximum fin and rudder load; nosing over condition; balance diagram; distribution of panel loads; table of panel-point loads; important to keep moments of panel loads same as those of original weights; distribution of fuselage weight itself among panel points

Note.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

most difficult to handle. (Continuation of serial.)

Wing Pressure Distribution. Study of Pressure Distribution Data. Air Corps Information Cir., vol. 7, no. 604, Nov. 1, 1927, 24 pp., 20 figs. Study to determine extent to which available pressure-distribution data justify rules for computation of external loads on wing cellule now in use by Air Corps and Bureau of Aeronautics; effect of air speed on pressure distribution; factors affecting distribution along span; effect of taper, tip shape, aileron movement, and of change in airfoil section; outline of proposed research. Bibliography.

Wings, Slotted. The Slotted Wing and Safety of the Airplane (L'aile á fente et la securité de l'avion). Aeronautique (Paris), vol. 10, no. 107, Apr. 1928, pp. 117–120, 6 figs. Discusses advantages of small movable wings at front and rear of main wings and their operation and effect; shows Villiers XXIV two-seater, night-flying airplane, fitted with Handley Page slotted wing.

ALLOYS

Age Hardening of. Age-Hardening of Alloys, Hay. Iron and Steel of Canada (Gardenvale, Que.), vol. 11, no. 5, May 1928, pp. 148–150. General mechanism of age hardening depended upon size of particles present in alloy; depression after quenching and before hardening commenced; temperature of precipitation caused difference in amount of hardening; time of soaking at high temperature before quenching; size of article influences degree of hardness age-hardening attainable; volume change due to precipitation of compound from solution caused by age-hardening. Paper read at Inst. of Metals.

Aluminum. See ALUMINUM ALLOYS.

Chromium. See CHROMIUM ALLOYS.

Copper. See COPPER ALLOYS

Heat - Resisting. Heat - Resisting Alloys (Hitzebestaendige Legierungen), W. Rohn. Korrosion und Metallschutz (Berlin), vol. 4, no. 2, Feb. 1928, pp. 25–28, 7 figs. Chemical changes produced in metals and alloys by high temperatures of about 1000 deg. cent.; illustrations from furnace and ceramic-oven practice, economy of special alloys. Paper read at Berlin Werkstofftagung of 1928.

Nickel-Copper. See NICKEL-COPPER ALLOYS.

ALUMINUM ALLOYS

Almelec. Almelec, a New Light Alloy for Wires and Cable Conductors. Mech. World (Lond.), vol. 83, no. 2158, May 11, 1928, p. 347. Details of physical constants of aluminum alloy developed in France for aerial power-transmission and telephone lines; contains 98.5 per cent pure aluminum and 1.2 per cent of magnesium and silicon and is subjected to special heat treatment in addition to being hard drawn; resistance to corrosion under atmospheric conditions is stated to be comparable with that of pure aluminum. Brief abstract translated from Revue Générale d'Electricité.

Self-Hardening. Self Hardening Light Alloys, E. V. Pannell. Am. Metal Market, vol. 35, no. 34, Feb. 21, 1928, p. 4. Certain distinct fields of use, for forgings and certain classes of sheet, and for light-alloy piston castings; two recent groups of alloys have been recently introduced in Germany under proprietary names, Alneon and Neonalium, which show marked improvement after stated period; developed by M. O. Wurmback; they are cheap, easily cast and require no difficult after treatment.

AMMONIA CONDENSERS

Heat Transfer in. Heat Transfer in Ammonia Condensers. Power, vol. 67, no. 20, May 15, 1928, pp. 862–863, 1 fig. Results of research undertaken at Univ. of Illinois in order to correlate and give proper weight to various factors entering into design and operation of outstanding types of ammonia condensers. Abstracted from Univ. of Illinois Bul. No. 25.

AUTOMOBILE ENGINES

Cylinders, Chromium Steel. Nitrated Chrome Steel Cylinders, L. Guillet. Foundry Trade Jl. (Lond.), vol. 38, no. 611, May 3, 1928, p. 314. According to experiments, employment of nitrated steel for cylinders gives results never before attained; steel has hardness that produces unequaled durability and resistance; exhaustive tests showed virtually no wear in pistons, whether of cast steel or aluminum alloy; necessity for lubrication was diminished. Brief abstract of paper presented to Académie des Sciences.

Crankshafts. Some Notes on Crankshafts, F. Strickland. Automobile Engr. (Lond.), vol. 18, no. 241, May 1928, pp. 182–184, 10 figs. Strength necessary to provide against fracture; rigidity to prevent distortion when running; bearing surface to give durability; distortion due to springing thin webs is likely to be serious matter; two-bearing 4-cylinder crankshaft; enormous advantage of two-bearing shaft; engines with more than four cylinders; method of balancing engine; worth while to machine crankshaft all over.

Pistons, Hardalloy. Hardalloy Pistons. Motor Transport (Lond.), vol. 46, no. 1207, Apr. 30, 1928, p. 547, 1 fig. Hardalloy pistons introduced after prolonged tests by Andrews Crankshaft and Cylinder Co.; made from special alloy lighter and considerably harder than aluminum; important advantages.

AUTOMOBILE PLANTS

Heat Treating Department. Heat Treating at Dodge Brothers Plant, H. E. Martin. Heat Treating and Forging, vol. 14, no. 5, May 1928, pp. 525–528, 2 figs. Electric furnaces of various types are successfully used in many heat-treating operations; methods are fully described; results and costs discussed; box-type, pusher-type, rotary-type, counterflow-type furnaces; furnaces for miscellaneous requirements.

Modernized Equipment for Heat Treating, F. W. Manker. Heat Treating and Forging, vol. 14, no. 4, Apr. 1928, pp. 386–387, 3 figs. Mechanization in handling pieces in process of heat treating in forge and treating departments of Willys-Overland Co.; hardening miscellaneous parts; annealing after drop forging.

Materials Handling. Handling is Part of Production, G. Lefebvre. Factory and Indus. Mgmt., vol. 75, no. 6, June 1928, pp. 1178–1182, 7 figs. Description of plant layout and mechanical materials-handling equipment at plant of Oakland Motor Car Co.; layout has been planned to minimize handling as distinct function and to make it integral with production.

Stutz. Efficiency Without Volume, B. Finney. Iron Age, vol. 121, no. 20, May 17, 1928, pp. 1375–1379, 6 figs. Methods of Stutz Motor Car Co. for controlling inventory, reducing wastage, handling materials mechanically, inspecting all parts minutely and machining castings by special operations; process calls for individuality, rather than standardization, but opportunities for introducing production economies are not overlooked; budget plan; bonuses given foremen for reducing losses; foremen meet every morning and examine each piece of rejected material to determine whether it can be salvaged.

AUTOMOBILES

Clutches. New Multiple Disk Clutch. Automotive Industries, vol. 58, no. 19, May 12, 1928, pp. 727, 1 fig. Friction clutch of multiple disk type brought out by Desroziers Co. of Paris; friction material molded directly to steel disks instead of being riveted on; driving disks of steel of 9.120 to 160 in. thickness; driven disks with molded lining with total thickness of 0.205 inch.

Design. American Cars for the Future, T. J. Little. Autocar (Lond.), vol. 60, no. 1696, May 4, 1928, p. 884, 3 figs. General adoption of supercharging and virtual disappearance of 4-cylinder engine; coming of light weight; among other predictions are revival of 2-stroke engine, particularly in connection with superchargers, revival in air-cooled engines, general adoption of power brakes on all but cheapest cars, and of chromium plating in place of nickel plating. Abstract of paper read before Soc. Automotive Engrs.

Manufacture (Ford). Equipment Makes Possible the Ford Model A, F. L. Faucote. Am. Mach., vol. 68, nos. 19 and 22, May 10 and 31, 1928, pp. 761–762, 3 figs., and 874–875, 11 figs. May 10: Operations on aluminum piston and extruded piston pin; aluminum alloy pistons equipped with three rings; 20 operations necessary to complete them; boring of skirt and facing of open end on Reed-Prentice lathe, which handles 240 per hour; extending operation on piston pin performed at rate of 210 per hour on PF-5 Ferracute press. May 31: Operations on Ford transmission case, gears and gear shifter housing; operation sheets; transmission of selective sliding-gear type; multiple dry-disk clutch has four driving disks and five driven disks; 4-spindle Ingersoll drum-type milling machine will mill top faces of about 189 transmission cases per hour. (Continuation of serial.)

AUTOMOTIVE FUELS

Detonation. Comparison of Methods of Measuring Knock Characteristics of Fuels, G. Edgar. Am. Petroleum Inst.—Bul., vol. 9, no. 7, Jan. 31, 1928, pp. 90–99 and (discussion) 99–102, 4 figs. October, 1926, conference for discussing present methods of measuring knock characteristics; U. S. Bureau of Standards, General Motors Corp., Standard Oil Co. of N. J., and Ethyl Gasoline Corp. were represented; report represents attempt to embody opinions of various laboratories, with author's analysis of data.

B

BEARINGS

Lubrication. An Experimental Determination of the Distribution and Thickness of the Oil-Film in a Flooded Cylindrical Bearing, J. Goodman. Instn Civil Engrs.—Sessional Notices (Lond.), no. 3, Mar. 1928, pp. 79–80. Mathematical theory of lubrication as set forth by Reynolds and extended by Sommerfeld is now very widely recognized, but, owing to lack of data when theory was first set forth, it is considered that some of assumed conditions are not altogether justified; account of recent experiments made with object of supplying such data.

BELTS

Stretch. Measurement of Elastic Stretch of High-Speed Belts (Messung der elastischen Nachdehnung des laufenden Riemens), O. Kammerer. Maschinenbau (Berlin), vol. 7, no. 9, May 3, 1928, pp. 413–414, 3 figs. Brief report on experimental studies of belt stretch, made at Berlin Institute of Technology; instruments for measuring stretch aad speed of belts; graph of distribution of velocities in belt drives; Steinmetz's qualitative study of residual stretch of belting run at high speed.

BOILER FEEDWATER

Treatment. Deoxygenating Feed Water. Eng. Progress (Berlin), vol. 11, no. 4, Apr. 1928, p. 118, 1 fig. Describes Rostex filter manufactured by Chr. Huelsmeyer, of Duesseldorf; filter is filled with special filtering packing of manganese-steel wool; this material extracts very large proportion of oxygen.

BOILER FURNACES

Flue Dust, Electric Precipitation. Flue Dust Recovery, H. W. C. Henderson. World Power (Lond.), vol. 9, no. 53, May 1928, pp. 284–289, 5 figs. Application of electric precipitation to powdered-fuel installations; general principles of process; Trenton Channel plant; results of tests made to determine efficiency; coal-drying operations.

Gas and Pulverized Coal. Furnaces for Combined Firing with Pulverized Coal and Gas (Feuerung zur gemeinschaftlichen Verbrennung von Kohlenstaub und Gas), A. Sauermann. Glueckauf (Essen), vol. 64, no. 17, Apr. 28, 1928, pp. 525–531, 7 figs. Experimental study, at Centrum mine, near Dortmund, of combined coke-gas and pulverized-coal firing of fire-tube boilers; description of experimental outfit, analyses of fuel used, heat balance; results reported very promising.

Pulverized Coal. A New Boiler Furnace for Flame-Tube Boilers without Combustion Chamber (Neue Kohlenstaubfeuerung fuer Flammrohrkessel ohne Brennkammer), K. Jaroschek. Waerme (Berlin), vol. 51, no. 12, Mar. 24, 1928, pp. 197–199, 1 fig. Describes new type of furnace in which pulverized coal is burned in flame-tube boiler without combustion chamber; operation tests show that, due to very low exhaust gas and residue losses, new furnace has high efficiency; shows under what conditions especially good results can be obtained with this type of firing.

BOILER PLATE

Properties. Investigations of Boiler Plate (Untersuchungen an Kesselblechen), A. Pomp. Stahl u. Eisen (Duesseldorf), vol. 48, no. 21, May 24, 1928, pp. 681–689, 17 figs. Results of tests show that the harder boiler plates, especially those of nickel steels, are superior to plates poorer in carbon, with regard to behavior at elevated temperatures, aging properties, and tendency to coarse-grained recrystallization.

BOILER SCALE

Preventives. A New Boiler-Scale Preventive (Neues Mittel gegen Kesselstein), E. Herms. Waerme- u. Kaelte-Technik (Erfurt), vol. 30, no. 4, Mar. 15, 1928, pp. 1–4. Effect and mode of use of patented solid compound "Hydrotor" or ("Berghausens Kesselspeisewasser-Zusatz") (B.K.Z.) alleged to dissolve old boiler scale and to prevent formation of new.

BOILERS

Design. Modern Boiler Problem, A. G. Christie. Power, vol. 67, no. 22, May 29, 1928, pp. 946–949. Boilers must now be designed for both convection and radiant-heat transfer and for much higher ratings; regulation of boiler feedwater; radiant heat.

Electric. 147,000 kw. in Electric Steam Boilers at Gatineau Paper Mill, W. P. Muir. Elec. News (Toronto), vol. 37, no. 10, May 15, 1928, pp. 55–57, 1 fig. Largest installation and largest units ever constructed produce practically

dry saturated steam; installation consists of four units, three of 42,000 kw. each, and one of 21,000 kw.; boilers deliver 190 lb. of steam to steam accumulator from which it is drawn at 125 lb.; high-grade porcelain insulators; new type of electrodes.

Efficiency Diagrams. The Low-Range Reflex-Ordinate Boiler-Efficiency Diagram. Power Engr. (Lond.), vol. 23, no. 266, May 1928, pp. 204 and 209, 1 fig. on supp. plate. Presents diagram having pressure lines which have been carried down to points opposite their corresponding saturation temperatures, and these points have been joined up to form "saturation curve."

Feed Controllers. A Boiler Feed Controller for High Pressures. Engineer (Lond.), vol. 145, no. 3776, May 25, 1928, p. 582, 2 figs. Improved type of feed controller specially designed for service on high pressure boilers; known as "Stets" feed controller, and is already in use in number of largest power stations in America.

Heads, Design. Boiler-Head Calculation According to Latest German Specifications (Die Kesselbodenberechnung nach den neuesten Vorschriften), G. Hoennicke. Waerme (Berlin), vol. 51, nos. 16 and 17, Apr. 21 and 28, 1928, pp. 297–300 and 322–327, 6 figs. Supplement of specifications of Oct. 1926; pressure stages; points in which revised specifications differ from those of 1926; recommendations for retention of Goldesberger formula; the best basket-head meridian.

Calculation of Strength and Most Favorable Shape of Dished Heads of Cylindrical Boilers of Uniform Plate Thickness (Ueber die guenstigste Gestalt des vollen, gewoelbten Bodens zylindrischer Kesseltrommeln gleicher Dicke und ihre Festigkeitsberechnung), A. Huggenberger. Schweizerische Bauzeitung (Zurich), vol. 91, nos. 17 and 18, Apr. 28 and May 5, 1928, pp. 203–208 and 217–221, 27 figs. Theoretical methematical analysis checked by precise tests in which deformations were measured by means of special electro-magnetic extensometers; derives formulas for most convenient shape and maximum stresses.

Heat Transmission in. Process of Heat Transmission in Boilers (Processus de la transmission de la chaleur dans les chaudières modernes, etc.), Roszak and Veron. Génie Civil (Paris), vol. 92, no. 8, Feb. 25, 1928, pp. 195–196. Authors show how laws of transmission of heat explain and coordinate phenomena observed in boilers, and justify success of methods which have resulted in radical modifications in design; data on proportions of heat absorbed by radiation and convection in boilers of various types. See translated abstract in Eng. and Boiler House Rev. (Lond.), vol. 41, no. 10, Apr. 1928, p. 504.

High-Pressure (Benson). The Benson Boilers of the Siemens-Schuckert Cable Manufacturing Plant at Gartenfeld (Das Heizkraft mit Benson-Kessel im Kabelwerk Gartenfeld der Siemens-Schuckertwerke), H. Gleichmann. Siemens-Zeit. (Berlin), vol. 8, no. 3, Mar. 1928, pp. 179–185, 7 figs. Detailed description of Benson boiler plant, 180 to 225 atmospheres of pressure, Ruths heat accumulator, steam turbine, etc.

Locomotive. See LOCOMOTIVE BOILERS.

BOLTS

Thin-Headed, Design. The Design of Thin Bolt Heads, W. Richards. Machy. (Lond.), vol. 32, no. 812, May 3, 1928, pp. 137–138, 2 figs. Discussion of how far thinning of head may proceed without actual loss of strength to whole bolt; untreated bolts produced from ordinary commercial bright-drawn hexagon mild steel; formulas required to determine proportions of bolt having equal strength in both shear and tension.

BUILDINGS

Heat Losses in. Determination of K Coefficients in Calculation of Heat Losses from Heated Buildings (Détermination des coefficients K employés dans le calcul des déperditions de chaleur des batiments chauffés), G. Prud'hon. Jl. des Usines á Gaz (Paris), vol. 52, no. 9, May 5, 1928, pp. 204–209, 3 figs. Description of apparatus for measuring calories absorbed by wall under test for obtaining value of coefficient K in formula for heat losses from walls of building; when and how apparatus is used.

C

CABLEWAYS

Design. The Design of Cableways (Il calcolo delle funivie), U. Vallecchi and C. Carretto. Rivista Technica delle Ferrovie Italiane (Rome), vol. 33, no. 17, Apr. 15, 1928, pp. 152–176, 2 figs. Extensive compilation on theoretical principles and practical methods of design of cableways, telphers, etc., based on works of Isaachsen, Findeis, Stabilini and others.

CARS, REFRIGERATOR

Iceless. Railway Refrigeration by Silica Gel. Refrigeration, vol. 43, no. 5, May 1928, pp. 49 and 92, 2 figs. Operating cycle of apparatus explained by reference to one of drawings; arrangement of apparatus as applied to refrigerator car.

CAST IRON

High-Test, Manufacture of. Developments in Furnace Practice for Production of High-Test Cast Iron, R. Moldenke. Fuels and Furnaces, vol. 6, no. 5, May 1928, pp. 726–730. Control of form of graphite in cast iron by use of proper charge, correct furnace and pouring temperatures, and use of special molds, results in improved physical properties of high-test cast iron; use of steel scrap; alloy cast iron; pearlitic cast iron; influence of graphite formation; influence of superheating upon formation of graphite; low-silicon and low-carbon cast iron.

Nickel. Economic Value of Nickel in Gray Cast Iron, D. M. Houston. Can. Foundryman (Toronto), vol. 19, no. 5, May 1928, pp. 33–36, 18 figs. Wide gulf existing between laboratory and foundry practice; problem of uniformity; structure building; machinability of gray iron depends primarily upon its freedom from chilled areas, corners and edges, and carbide spots; reduction of chilling power of iron; addition of nickel and its effects upon Brinell hardness; making addition of alloying elements. Summary of adresses at Montreal and Toronto.

CASTING

Vacuum System. Casting Metals by the Vacuum System. Metal Industry (N. Y.), vol. 26, no. 5, May 1928, p. 228, 1 fig. Vcauum principle, which is basis of methods used in casting glass automatically, has been applied to permanent-mold casting of metals in machine developed by A. Kadow, chief engineer of Owens Bottle Co., who applied his knowledge of glass casting to perfection of metal-casting machine that would embody vacuum-casting idea.

CHIMNEYS

Heat Losses. A Simplified, Exact Method of Calculating Stack Losses (Eine vereinfachte und eine genaue Berechnung des Schornsteinverlustes) H. Kolbe. Brennstoff und Waermewirtschaft (Berlin), vol. 10, no. 5, Mar. 1, 1928, pp. 91–98, 8 figs. Formulas, tables of constants and charts for exact computation of loss of heat through smoke stacks; several of numerical examples.

CHROMIUM ALLOYS

Welding. Welding of High Chromium Alloys. Heat Treating and Forging, vol. 14, no. 5, May 1928, pp. 502–504 and 524, 7 figs. Review of procedure for welding various types of corrosion resisting alloys; importance of proper flux to protect molten and heated metal; bronze-welding rustless iron; stainless steel; rustless or stainless iron; extra high-chrome alloys; castings. Reprinted from Oxyacetylene Tips.

CHROMIUM PLATING

Automatic. Chromium Plating Applied Automatically, F. W. Curtis. Am. Mach., vol. 68, no. 19, May 10, 1928, pp. 765–767, 5 figs. Chromium plating of brake cams on production basis, by means of conveyor-type unit is being carried out by Chevrolet Gear and Axle Co. of General Motors Corp.; work started at loading station and transferred to acid-cleaning tank; water rinse; chromic-acid bath; plating solution consists chiefly of chromic acid and chromic sulphate.

CHROMIUM STEEL

Heat Resisting. Heat Resisting Steels—Mechanical Properties, W. H. Hatfield. Iron and Steel Inst.—advance paper (Lond.), no. 6, May 1928, 22 pp. Deals with mechanical strength of steels at high temperature, as affected by introduction of special elements; steels investigated include chromium, silicon-chromium, chromium-nickel, chromium-nickel-silicon and chromium nickel-tungsten series. See abstract in Engineering (Lond.), vol. 125, nos. 3252 and 3253, May 11 and 18, 1928, pp. 589 and 622 and discussion on pp. 601–602.

CLUTCHES

Electromagnetic. Electro-magnetic Clutches, H. T. Wright. Machy. (Lond.), vol. 32, no. 812, May 3, 1928, pp. 132–134, 7 figs. Methods of calculation and practical examples of designs; for large powers, refinement in design is necessary; flat surfaces replaced by tapered surfaces to give gradual engagement, and to allow for slight errors in alignment of driver and driven parts; example of simple clutch; clutch for light work; designs with non-magnetic contact surfaces; clutch for large powers; pulley application with reversing motor.

COAL

Carbonization, Lurgi Process. Features of Construction and Process Application of Lurgi Methods at Wyoming Coal Briquetting Plant. Min. Rec., vol. 30, no. 2, Apr. 30, 1928, pp. 13–15, 3 figs. Résumé of article published in Mar. 31 issue of same journal; reproductions of drawings and charts showing what plant is designed to accomplish and how it is to function; economies of Lurgi process are based on efficient utilization of gas mixtures by means of circulatory system; claims made for processed Wyoming lignite fuel.

COAL HANDLING

Conveyors. Long Distance Coal Conveying on Belt Conveyors, E. C. Auld. Cassier's Indus. Mgmt. (Lond.), vol. 15, no. 5, May 1928, pp. 160–161. Data for $3^{1}/_{2}$ years' operation of equipment handling total of 9,390,000 tons of coal; daily capacity as high as 13,866 tons; length 15,398 ft.; total lift 353.3 ft.; 57 per cent of belts originally supplied are still in service. Abstract of paper before Am. Inst. of Min. and Met. Engrs.

Portable Flight Conveyor to Work With Car Unloader. Power Plant Eng., vol. 32, no. 11, June 1, 1928, p. 648, 1 fig. Designed to work with Wagesaver car unloader, new Wagesaver portable flight conveyor, known as Type D, has been put on market; it has handling capacity of 60 to 90 tons of coal an hour, depending on grade and size handled.

CONTAINERS

Design. The Building of Containers for Severe Service, T. M. Jasper. Indus. and Eng. Chem., vol. 20, no. 5, May 1928, pp. 466–470, 8 figs. Containers used in chemical, oil-cracking, and steam engineering are required to carry increasingly high pressures, withstand great variations of temperature, and resist corrosive effects of great variety of conditions; problem divides itself into four parts; knowledge of working conditions and materials; design of apparatus to insure strength; protection of vessels during construction; testing vessels.

CORES

Electric Baking. Core Baking With Electric Heat, J. S. Keenan. Can. Foundryman (Toronto), vol. 19, no. 5, May 1928, pp. 36–37, 3 figs. Heat-treatment process in core making is dual operation of drying and baking; heat evaporates moisture in core and bakes core binder; from two to four changes of air per hour provided; batch or compartment core ovens; at baking temperatures, transfer of heat from source to core surfaces is largely by convection; electric oven is ideal for core baking; operated at off-peak rates at night without labor charge for attendance.

COPPER ALLOYS

Heat Treatment. The Effect of Heat Treatment on Some Mechanical Properties of 90:6:3:1 Copper-Tin-Zinc-Lead Alloy, R. J. Anderson. Am. Metal Market, vol. 35, no. 55, Mar. 22, 1928, pp. 3–5, 19 figs. Metallographic constitution of alloy; prior work on copper-tin-lead-zinc alloys; microscopic examination; method of investigation; uses of this alloy; selected bibliography.

CUPOLAS

Design. The Zone Formation in Cupolas and Its Influence on Melting Process (Die Zonebildung im Kupolofen und ihr Einfluss auf den Schmelzvorgang), K. Muehlbradt. Giesserei (Duesseldorf), vol. 15, no. 15, Apr. 13, 1928, pp. 335–339, 8 figs. Points out difference in flow diagram of ideal gas producer and of cupola; influence of melting process on combustion.

D

DIES

Forging. Die Design for Progressive Deep Piercing, E. R. Frost. Heat Treating and Forging, vol. 14, no. 5, May 1928, pp. 507–512, 30 figs. Method of forming hot-forged articles directly from bar stock by progressive piercing operations; life of tools is increased; high production rate obtained; socket wrench forging; punch life in progressive piercing; severing forging from bar; support of piercer; extrusion principle not used; application of method is broad. Abstract of paper read before Am. Soc. Steel Treating.

DIESEL ENGINES

Airless Injection. First Airless Injection,

Double Acting Engine. Mar. Eng. and Shipg. Age, vol. 33, no. 6, June 1928, pp. 326–327, 3 figs. Built on Hesselman system of fuel injection designed to develop 4500 b.hp. at 90 r.p.m. in normal service; six cylinders 700 mm. in diameter with piston stroke of 1200 mm.; new cylinder construction.

Automotive. The Automotive Full-Diesel Engine, R. J. Broege. Ry. Age (Motor Transport Sec.), vol. 84, no. 21, May 26, 1928, pp. 1245–1248, 6 figs. Operating performance compared with gasoline engine; electric starters may be used; describes American-built Diesel, built under license and to patents of Maschinenfabrik Augsburg-Nurnberg, Germany; engine shown has $4^1/_2$-in. bore and $7^1/_8$-in. stroke; service and performance curves of Diesel-engine truck as compared with gasoline-engine truck; engineering features; starting and control; lubrication and other features. Abstract of paper presented before Soc. Automotive Engrs.

Design. Co-operative Design, C. E. Cox. Am. Mach., vol. 68, no. 22, May 31, 1928, pp. 869–871, 2 figs. Factors influencing design of bearings, gears, drives and lubrication of Diesel engines; complication of modern design demands consultation between design, production and purchasing departments; absolutely necessary that crankshaft be imbedded in rigidly supported main bearings, carefully aligned, perfectly fitted, and lubricated by most effective system; advantage of babbitt bearings; pressure lubrication; selection of coupling.

Double-Acting (Hesselman). A New Double - Acting Engine. Brit. Motor Ship (Lond.), vol. 9, no. 98, May 1928, pp. 70–72, 6 figs. Details of 4500–6000 s.hp. 6-cylinder A.E.G.-Hesselman airless-injection type; no camshaft; no air compressor is required and scavenging is supplied from electrically driven turbo-blowers; cylinder diameter is $27^1/_2$ in. and stroke $47^1/_4$ in.; fuel consumption works out at about 0.38 lb. per b.hp-hr.

High-Speed. High-Speed Diesel Engines, O. D. Treiber. Eng. Soc. of Buffalo—Bul., vol. 8, no. 3, Mar. 1928, pp. 3–9 and (discussion) 9–12. Air injection; solid injection; self-ignition; semi-self-ignition; mechanics of Diesel engine; new metal alloys aid weight reduction; high pressures necessitate heavy construction; time lag serious barrier; possibilities of direct injection; paper read before Buffalo Section Society Automotive Engineers.

Power Plants. High Powered Diesel Engines for Peak Loads, M. Gercke. Engineer (Lond.), vol. 145, no. 3773, May 4, 1928, pp. 496–497, 2 figs. Deals with aspects of peak load problem and its solution by adoption of Diesel engine of high power; economic effect of peak loads on efficiency of steam power plants; installation of peak-demand Diesel engines. Abstract of paper read before Diesel Engine Users Assn.

Research. Automobile Pioneer Develops New Diesel Engine. Oil Engine Power, vol. 6, no. 5, May 1928, pp. 314–317, 10 figs. Exhaustive investigation in producing high-speed two-cycle engine conducted by F. B. Stearns; gradual evolution to technique of experimental determinations; balanced diaphragm type of pressure indicator; provision for measuring volume of intake air; 6-cylinder, two-cycle unit with overhead valves and camshaft and Roots blower; complete collection of machine tools.

DRILLING MACHINES

Multiple-Spindle. Archdale Motor-Driven Units Multi-Drilling and Multi-Tapping Machines. Brit. Machine Tool Eng. (Lond.), vol. 5, no. 51, May and June 1928, pp. 49–52, 4 figs. Advantages of standardization, although only capable of being applied in limited way, are very evident in construction of multi-spindle drilling machines described; each drilling or tapping head is complete unit with self-contained motor drive.

E

ECONOMIZERS

Galloway. The Galloway Supermiser. Mech. World (Manchester), vol. 83, no. 2156, Apr. 27, 1928, pp. 310–311, 3 figs. Invention designed to abstract maximum amount of heat from boiler-fuel gases before they are discharged into chimney; feature of design is use of concentric tubes; hot gases pass through annular space between inner and outer tubes; feed-water passes through inner tubes, while air to be heated sweeps over outer surfaces of outer tubes.

ELECTRIC FURNACES

Heat Treating. Furnaces for Continuous Heat Treatment, W. C. Stevens. Heat Treating and Forging, vol. 14, no. 4, Apr. 1928, pp. 423–424, 2 figs. Construction and operation of electric furnace for hardening small parts of quantity production; uniform results obtained; pusher type furnace; even heat distribution; pusher mechanism; automatic control obtained through pyrometers, necessary relays and contractors.

ELECTRIC LOCOMOTIVES

France. High-Speed Electric Locomotives (Locomotive électrique à grande vitesse). Génie Civil (Paris), vol. 92, no. 2386, May 5, 1928, pp. 429–433, 12 figs. Constructed by Société Alsacienne de Constructions Mécaniques for P. L. M. Railroad Co.; feed wire current 1300 volts; length 21 m. weight 130 tons; motors have forced ventilation; eight motors in four groups of 550 hp. each, revolving 630 r.p.m. for speed of 50 km. per hr.; recuperative braking is used.

Individual Axle Drive. Locomotive with Vertical Motors, H. Furst. Elec. World, vol. 19, no. 22, June 2, 1928, pp. 1158. Austrian Federal Railways operate novel type of express locomotive of their electrified valley lines, which has given unusually good performance; new feature is individual motor drive for each axle by means of four vertical-shaft motors transmitting their power over spiral-type bevel gears and special flexible couplings to drivers. Brief abstract translated from Elektrotechnik und Maschinenbau, Apr. 8, 1928.

ELECTRIC WELDING, ARC

Developments. A Brief History of Arc-Welding, A. Churchward. Heat Treating and Forging, vol. 14, no. 5, May 1928, pp. 522–524, 1 fig. Steps in development of art that is now indispensable; working metals by electricity; Baldwin Locomotive Works pioneers; first great impetus given to metallic arc welding during World War; outstanding developments of past 10 years; bronze, copper, gun-metal and brass welded readily by electric arc process.

New Process. A New Principle Applied to Carbon-Arc Welding. Am. Mach., vol. 68, no. 22, May 31, 1928, pp. 891–892, 4 figs. Clean ductile welds produced by Electronic Tornado process; head consists of apparatus necessary to rotate carbon rod, feed it automatically, feed fluxing material, and to create strong magnetic field about arc; this field is weak in center of arc but becomes stronger as arc departs from geometric axis of rod.

F

FLOW OF GASES

Orifices. Flow of Gases Through Small Orifices, E. L. Rawlins. Oil and Gas Jl., vol. 26, no. 51, May 10, 1928, pp. 111–112, 125–126 and 128, 5 figs. Bureau of Mines completes careful study of various conditions of flow under high and low differential pressures; summary of important information contained in Technical Paper of U. S. Bureau of Mines.

FLOW OF WATER

Pipes. An Experimental Study of the Flow of Water in Pipes of Rectangular Section, S. J. Davies and C. M. White. Roy. Soc.—Proc. (Lond.), vol. 119, no. A781, May 1, 1928, pp. 92–107, 3 figs. Investigation to determine range over which equations of viscous flow could be applied to flow of fluids in small clearances between moving and fixed parts of certain machines tests made in Engineering Laboratories, King's College, London; 400 tests on pipes varying in section from 2.54 cm. broad by 0.0154 cm. deep to 2.54 cm. broad by 0.0681 cm. deep.

FLUIDS

Resistance to Moving Spheres. Fluid Resistance to Moving Spheres, R. G. Lunnon. Roy. Soc.—Proc. (Lond.), vol. 118, no. A780, pp. 681–684, 6 figs. Timing falls of metal spheres in water through distances up to two meters, resistance if fluid at high speeds was measured both for accelerated and for unifrom motion; during accelerated motion resistance is increased in regular way; effect of cylindrical walls measured; motion of fluid behind sphere.

FORGINGS

Steel, Heat Treatment of. Mass Effect in the Heat-Treatment of Large Forgings, J. A. Jones. Metallurgist (supp. to Engineer, Lond.), May 25, 1928, pp. 70–72. Influence of mass in heat treatment of alloy steels can be illustrated by tests taken from properly treated forgings of different compositions; gives tables of mechanical properties at middle of wall and at outside, and mechanical properties of large forgings and of small pieces which have received same treatment. (To be continued.) Communication from Research Department, Woolwich.

FUELS

[See AUTOMOTIVE FUELS; COAL.]

FURNACES

Annealing—Normalizing. New Type Sheet Normalizing Furnaces Installed at Newton Steel Company, C. P. Mills. Fuels and Furnaces, vol. 6, no. 5, May 1928, pp. 603–606 and 646, 2 figs. Two continuous furnaces of sectional construction, each 155 ft. long, equipped with special insulated disk rollers and arranged for burning gas or oil, normalize deep drawing steel sheet with fuel consumption of 5525 cu. ft. coke-oven gas per ton. From paper presented before Engrs. Soc. West. Pa.

The Kathner Normalizing Furnace, C. P. Mills. Heat Treating and Forging, vol. 14, no. 4, Apr. 1928, pp. 428–431, 4 figs. Continuous-type gas furnace for sheets; special insulation reduces heat losses and improves quality of product; two independent sets of burners for use of oil when natural gas is not available; conveying mechanism; temperature control equipment; driving mechanism; performance in operation. Abstract of paper presented before Am. Soc. Mech. Engrs. and Engrs.' Soc. of West. Pa. See also Blast Furnace and Steel Plant, vol. 16, no. 4, Apr. 1928, p. 502.

Forging, Pulverized-Coal. Forging Furnaces Operated With Powdered Coal, W. C. Rehfuss. Ry. Mech. Engr., vol. 102, no. 5, May 1928, pp. 279–282, 8 figs. Method has reduced maintenance costs and number of furnaces required; description of plant; early design of powdered-coal furnaces; trench-type powdered-coal forge; type of furnaces now used; advantages of new designs.

Heating. The Mechanization of Heating Furnaces, J. R. Miller. Heat Treating and Forging, vol. 14, no. 5, May 1928, pp. 546. Devices for handling material into and out of furnace and for manipulating pieces in furnace lead to labor and fuel saving as well as better quality; earlier progress made in steel mills; mechanization in forge shop.

Heat-Treating, Continuous. Mass-production Heat Treatment, J. W. Urquhart. Machy. (Lond.), vol. 32, no. 812, May 3, 1928, p. 155. Continuous-action automatic furnace; pusher type of furnace is undoubtedly parent of present ambitious attempts; system has now been so far developed that it is for smaller mass-produced class of goods, entirely automatic; heat distribution and temperature control.

G

GEARS

Helical. The Accuracy of Large Hob-Cut Helical Gears, G. A. Tomlinson. Engineering (Lond.), vol. 125, nos. 3251 and 3253, May 4 and 18, 1928, pp. 531–532 and 598–600, 9 figs. May 4: Number of hob teeth engaged; distribution of cutting work; effects of errors in hob. May 18: Effect of certain errors in hobbing machine.

Integral-Contact. Mechanical Resonance One Cause of Gear Noise and Wear, A. B. Cox. Am. Mach., vol. 68, no. 21, May 24, 1928, pp. 848–851, 7 figs. Integral contact gears are proposed to eliminate torsional vibration; this vibration of gears is caused by fluctuations in length of load-carrying face and results in extremely high loads when natural period is reached; besides being noiseless and long-lived, integral contact gears are capable of carrying loads that are enormous as compared to loads ordinary gears can carry.

Teeth, Finishing. A New Process of Finishing Gear Teeth, E. Sheldon. Am. Mach., vol. 68, no. 20, May 17, 1928, pp. 810–814, 11 figs. Process of finishing teeth of unhardened gears in exact conformity with theoretically correct involute curve, developed by Pratt and Whitney Co.; machine practically automatic; designed to operate only upon spur gears 2 in. and less in face width; profile in single cut parallel to involute produced instead of large number of perpendicular cuts; setting of shaving tools after regrinding is extremely simple.

GRAIN HANDLING

Penumatic. Pneumatic Handling of Grain. Modern Transport (Lond.), vol. 19, no. 478, May 12, 1928, p. 2627, 2 figs. Pneumatic plants recently installed for discharging large grain ships at new Beaufort Road Mills, Birken-

head; plant comprises two separate units each capable of dealing with 100 tons of wheat per hour; two braced-steel towers, each carrying two intake pipes, fitted with telescopic sections; intake towers; booms and winches; air-pipe operations; vacuum pumps.

H

HARDNESS TESTING

Duroscope. A Handy Hardness Tester. Eng. Progress (Berlin), vol. 11, no. 4, Apr. 1928, pp. 117–118, 6 figs. Tester "Duroscope" of von Leesen system is pendulum testing instrument which works on rebound principle; head of pendulum has spherical end, which, for ordinary workshop use in metal-working industries is made of hard steel, for ceramic and cement industries of tungsten-iridium, and for special testing purposes of diamond.

HEAT, FLOW OF

Fluctuating Temperature. Temperature and Flow of Heat in Periodically Heated Bodies (Temperaturverlauf und Waermestroemungen in periodisch erwaermten Koerpern), H. Groeber. Forschungsarbeiten auf dem Gebiete des Ingenieurwesens (Berlin), no. 300, 1928, pp. 3–13, 8 figs. General mathematical theory of thermal storage in bodies located in media of regularly fluctuating temperatures; considers case of infinitely thick body bounded by planes and case of infinitely long cylinder; comparison between cylinder and plate. Paper read at session of Committee on Thermodynamic Research of German Society of Engineers. (V.D.I.)

HEAT PUMPS

Applications. Heat Pumps for the Operation of Evaporators (Vapor Compressors) and as Steam-Pressure Converters (Die Waermepumpe fuer den Betrieb von Verdampfern (Bruedenkompression) und als Dampfdruckumformer, A. Oetken. Waerme (Berlin), vol. 51, no. 17, Apr. 28, 1928, pp. 315–321, 16 figs. Discusses principle of design and different types of heat pumps; their significance in comparison with single-effect and multiple-effect evaporators; application of heat pump and examples of actual installations; advantages of steam-pressure conversion.

HEAT TRANSMISSION

Engine Cylinders. Heat Transfer Between Working Substance and Cylinder Walls of Reciprocating Engines (Der Waermeuebergang zwischen Arbeitsmedium und Zylinderwand in Kolbenmaschinen), W. Nusselt. Forschungsarbeiten auf dem Gebiete des Ingenieurwesens (Berlin), no. 300, 1928, pp. 15–32, 5 figs. Summarizes European theoretical and experimental studies of heat transfer in cylinders of steam engines, gas compressors and liquefiers and internal combustion engines. Paper read at session of Committee on Thermodynamic Research of German Society of Engineers. (V.D.I.)

HELICOPTERS

Lifting Propellers, Theory of. The Theory of Lifting Propellers (Theorie der Hubschraube), O. Flachsbart. Zeit. fuer Flugtechnik und Motorluftschiffahrt (Munich), vol. 19, no. 8, Apr. 28, 1928, pp. 177–183, 8 figs. Theoretical report from Kaiser Wilhelm Institute for Research in Dynamics of Fluids, on helicopter propellers; formulas and curves of capacities, thrust stresses, effect of hub, etc.; numerical example illustrating method of design.

HYDRAULIC TURBINES

High-Head. Application of Impulse and Reaction Turbines to Modern Hydro-electric Installations, E. M. Breed. Hydraulic Eng., vol. 4, no. 5, May 1928, pp. 255–257 and 264–267, 10 figs. Lubrication; water lubrication; design of draft tube; primary control; governor actuator; low-head turbines; automatic and remote control; application of various types of units thoroughly discussed and relative efficiencies of impulse and reaction types indicated. (Concluded.)

Vertical vs. Horizontal Shafts. Note on the Comparative Advantages and Disadvantages of Hydraulic Machines with Vertical or Horizontal Axes (Note sur les avantages et les inconvénients comparés des groupes hydroélectriques á axe vertical et á axe horizontal), E. Dusaugey. Revue Générale de l'Electricité (Paris), vol. 23, no. 17, Apr. 28, 1928, pp. 395–396. Notes of turbine construction, from hydraulic, mechanical and civil-engineering standpoints.

I

INDICATORS

Internal-Combustion-Engine. A New High Speed Engine Indicator, K. J. De Juhasz. Instruments, vol. 1, no. 4, Apr. 1928, pp. 179–185, 5 figs. New indicator for taking accurate pressure diagrams of internal-combustion engines up to highest speeds; principle of De Juhasz indicator; consists of pressure measuring indicator, valve element, phase timing planetary gear, and drum actuating gear; small pressure variations in intake manifold, or carbureter jet, or high pressures in Diesel engine measured.

INDUSTRIAL MANAGEMENT

Appraisals. The Scope and Application of Certified Appraisals, G. B. Waterstraat. Jl. of Accountancy, vol. 45, no. 5, May 1928, pp. 335–350. Fundamental appraisal of today is inventory of plant assets and if properly applied and followed will serve as plant record; appraiser's practice; considers how cost of production would be affected by depreciation.

Distribution Problems. What Scientific Distribution Means to All Concerned, F. H. Payne. Mill and Factory Illustrated, vol. 1, no. 5, May 1928, pp. 19–20 and 61. Advantages to manufacturer of scientific distribution are: (1) lower selling expense, (2) more concentrated sales effort, (3) lower finished stock inventory, (4) fewer accounts, (5) fewer shipments, (6) better customers' credit; advantages to buyer are: (1) lower supply inventory, (2) quicker delivery, (3) greater selection, (4) regular service; even these advantages are susceptible of greater refinement.

Inventory Control. Ready Means for Inventory Control, L. I. Thomas. Mfg. Industries vol. 16, no. 1, May 1928, pp. 33–36, 3 figs. Methods of operating purchasing and stores departments to assure adequate stocks with small inventories, minimum records and low costs.

Machine - Time Records. Idle Machine Time. Automobile Engr. (Lond.), vol. 18, no. 241, May 1928, pp. 175–176, 2 figs. New instruments for recording actual machine hours; principle of operation consists in comparing markings produced by periodic impulses from machines when running with time record produced by second series of impulses from works clock or time recorders; time embossed along side of chart; recorder connected by line wires to separate machines and may be situated in manager's office.

Motion Study with Stroborama. The Stroborama. Instruments, vol. 1, no. 4, Apr. 1928, pp. 205–208, 3 figs. Instrument for study of all fast periodic motions by direct visual observation; Neon lamp produces illumination of 1000 candle power; light is well diffused; observations made in full daylight; current control and synchronization; independent synchronization; different parts of mechanism moving at different speeds may be brought to rest successively at moment's notice; uses of stroborama made by Musa-Hartzell-Ducasse, Inc.

Production Control. Modern Production Methods, E. W. Hancock. Automobile Engr. (Lond.), vol. 18, no. 241, May 1928, pp. 179–181. Present trend and future possibilities of work of production engineer; planning; materials handling; design and production; installation of machines; detail processing; assembly; machine-tool service; production engineers in position to render greatest service to industry as whole; best possible opportunities should be given them for widening their experience; great emphasis laid upon importance of travel; costs must continually be considered. Abstract of paper presented to Inst. Production Engrs.

Production Planning, Ford Plant. Planning and Mass Production Coordinated, F. L. Faurote. Factory and Indus. Mgmt., vol. 75, no. 5, May 1928, pp. 984–987, 5 figs. Channels of parts-supply kept open to insure even flow at assembly line; 11,000,000 parts in production and 2000 new Ford cars daily; machine-tool register of all machines owned by Ford industries, entire history of each machine tool; Ford-special-redesigned electric seam-welders.

Tool-Room Practice. How the Ford Tool Rooms Are Organized, F. L. Faurote. Mill and Factory Illustrated, vol. 1, no. 2, Feb. 15, 1928, pp. 21–25, 9 figs. Six self-contained tool rooms are needed in Ford Motor Co. plant; organization, orders and records for each of these is described; in tool-design department, where original sketches and drawings are made, there is division of work into seven groups; work in tool rooms is carried on in same efficient manner as production work in main shops.

INGOT MOLDS

Design. Trend in Ingot Mold Design, R. H. Watson. Iron Age, vol. 121, no. 22, May 31, 1928, pp. 1579–1580, 2 figs. Molten steel poured into iron mold freezes in three distinct phases; how taper affects freezing conditions; necessity of any taper whatever is questionable; life of molds vs. pipes in ingots; some of problems of hot tops. Abstract of paper presented at Am. Iron and Steel Inst.

INTERNAL COMBUSTION ENGINES

Vibration. Vibration from Internal Combustion Engines, J. M. Bloomfield. Power House (Toronto), vol. 22, no. 10, May 20, 1928, pp. 35–36. Causes of vibration are subsoil, periodic forces and misfiring; primary and secondary forces.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES.]

IRON CASTINGS

Defects. Hidden Defects in Iron Castings, P. R. Ramp. Iron and Steel (Gardenvale, Que.), vol. 11, no. 5, May 1928, pp. 140–143, 4 figs. Method of localizing shrink cavities and blowholes to places where they cannot harm casting; if casting is so molded that all defects will appear on surface, or will be discovered during machining, there will be fewer failures in service; locating hidden defects.

L

LOCOMOTIVE BOILERS

Corrosion Prevention. Prevention of Sub-Aqueous Corrosion by Electro-Chemical Polarization Process, O. W. Carrick. Am. Water Works Assn.—Jl., vol. 19, no. 6, June 1928, pp. 704–713, 3 figs. Development stages of electro-chemical polarization system as applied to locomotives; effectiveness of anti-corrosion scheme polarization system installed in engines; workings of this system of protection described; process is being applied to all Chicago and Alton Railroad Company's locomotives.

Design. The Design and Proportion of Locomotive Boilers, C. A. Brandt. Ry. Mech. Engr., vol. 102, no. 5, May 1928, pp. 254–258, 12 figs. Discussion of boiler ratios, firebox heating surface, superheaters and feedwater heaters; gas area through boiler; length of flues for proper efficiency.

LOCOMOTIVE REPAIR SHOPS

Montreal. Montreal Locomotive Erection and Machine Shop, Canadian National Railway. Can. Ry. and Mar. World (Toronto), no. 363, May 1928, p. 253, 2 figs. Building will be 265 ft. wide by 1056 ft. long; location for more than 400 machines; accompanying plans show general floor layout; locomotives will be handled by 200-ton electric overhead traveling crane.

LOCOMOTIVES

Boosters. Franklin Reversible Locomotive Booster. Ry. Age, vol. 84, no. 19, May 12, 1928, pp. 1109–1110, 5 figs. Locomotive booster can be operated both forward and reverse; parts of reversible booster are identical with those of one-way booster; found from experience with one-way booster that in certain conditions of hump and helper service, use of two boosters on one locomotive would be profitable.

Design. The Locomotive as a Factor in Fuel Economy, A. W. Bruce. Ry. Age, vol. 84, no. 20, May 19, 1928, pp. 1153–1155, 3 figs. Possibilities of future and of designs now available: suggested basis for retirements; 2-pressure stage system has already been applied to locomotives and offers one of most promising solutions known at present; three cylinders are used; discusses question as to how high will pressures go; evolution of freight power; how modern locomotive compares with its predecessors; life of freight locomotive. Abstract of paper presented at convention of Int. Ry. Fuel Assn.

Diesel. Diesel Locomotives. Ry. Age, vol. 84, no. 19, May 12, 1928, pp. 1107–1108. Committee on Diesel locomotives presented very complete report of developments in Diesel locomotive field during past year; Kitson-Still locomotive; this engine in addition to its low fuel consumption offers good combination for train starting; comparison of Diesel and steam-locomotive operations; savings in operating expenses of Diesel over that of steam locomotives ranges from 7.33 per cent to 55.7 per cent; comparison between Russian Diesel gear and electric locomotives.

Diesel Locomotives with Schwartzkopff-Huwiler Hydraulic Gears (Diesellokomotive mit Fluessigkeitsgetriebe, Bauart Schwartzkopff-Huwiler), K. Vetter. V.D.I. Zeit. (Berlin), vol. 72, no. 18, May 5, 1928, pp. 603–604, 4 figs. Experimental use of hydraulic gear, often used for

speed regulation of rotary machinery, in 44-ton Diesel locomotive; detailed data on performance during trial trips.

Electric. See ELECTRIC LOCOMOTIVES.

Internal-Combustion (Kitson-Still). The Kitson-Still Locomotive. Engineer (Lond.), vol. 145, no. 3773, May 4, 1928, pp. 484–485, 4 figs. Results of trial runs with complete train; on neither run did engine maintain schedule times, but on both she demonstrated her ability to haul train and ease with which she can be handled. See editorial comment on pp. 491–492.

Steam-Turbine. Report on Steam Turbine Locomotives. Ry. Age, vol. 84, no. 19, May 12, 1928, pp. 1106–1107, 2 figs. Condensing turbo-locomotives show horsepowers ranging from 4000 to 8000 with tractive forces from 78,000 to 191,000 lb.; advantages of turbo-electric locomotive; high tractive force at low speeds; bibliography of articles in American and European technical journals covering design and development of steam-turbine locomotive.

Testing Plants. A Locomotive Testing Plant, F. W. Dean. Engineer (Lond.), vol. 145, no. 3774, May 11, 1928, p. 615. Author gives his idea of what locomotive test plant should be; no locomotive testing plant has been built that gives more than approximate idea of steam or coal consumption of locomotive; reasons for inaccuracy are that there are several uses of steam besides that by main cylinders; another trouble is to make tests sufficiently long; way to overcome these difficulties is to have steam-consumption tests made with steam from stationary water-tube boilers and passing through separately fired superheater.

LUBRICATION

Low Temperatures. Lubrication Problems at Low Temperatures. Chem. and Met. Eng., vol. 35, no. 5, May 1928, pp. 275–276. Petroleum and industrial divisions of American Chemical Society hold joint session on recent developments of interest to maker and user; account of investigation carried out for determining effects of viscosity and pour test upon performance characteristics of automotive-engine oils; results of similar investigation carried out by Atlantic Refining Co.; results of research along different line with lightly loaded bearings operated at very high speeds; possibility of improving locomotive-journal lubrication.

M

MACHINE DESIGN

Errors. Common Errors in Machine Design. Machy. (Lond.), vol. 32, no. 813, May 10, 1928, pp. 174–175. Centrifugal force, vibration, gravity, friction, distortion, variation in product, expansion and contraction, and in accessibility for repairs and adjustment are common factors responsible for failure of machines to function properly; factors that cause vibration; failure of gravity as usable force; expansion caused by heat; avoiding trouble caused by variations in stock.

MACHINE TOOLS

Exhibition, Leipzig Fair. Tools and Machine Tools Exhibited at the Leipzig Spring Fair, 1928 (Werkzeuge und Werkzeugmaschinen auf der Leipziger Fruehjahrsmesse 1928), E. Preger. Maschinenbau (Berlin), vol. 7, no. 10, May 17, 1928, pp. 453–487, 173 figs. Numerous notes on exhibits of precision tools, cutting tools and cutting machine tools, machines for forging and working of rods, shafts and plates; testing machines.

Labor-Saving Devices. Time-Saving Devices in the Landis Shop. Machy. (Lond.), vol. 32, no. 812, May 3, 1928, pp. 148–150, 6 figs. Number of time and labor-saving devices, tools, and fixtures employed in shops of Landis Machine Co.; some, in addition to efficiency, ensure greater accuracy; foolproof indexing fixture; fixture for milling slots in die-head bodies; turret tool for grooving gear blanks; fixture for inspecting cutters; fixture for boring hole in correct location relative to inclined surface.

MATERIALS HANDLING

Foundries. Revising Handling Methods in a Modern Foundry, F. D. Campbell. Can. Machy. (Toronto), vol. 39, no. 9, May 3, 1928, pp. 50, 52, 54 and 56, 3 figs. Describes conversion of job-shop steel-foundry work to mass-production basis; arranges all manufacturing for sequential movement; all molding sand via belt conveyor; molds are carried on roller conveyor systems; fabrication of frames; pouring system is entirely overhead; distribution is effected by three circulatory loop monorail or double-rail systems; regulator of schedules; systematic manufacture.

MATERIALS

X-Ray Analysis. Analysis of Minerals, Ores and Industrial Products by Means of X-Rays (La détermination à l'aide des rayons X des minéraux, minérais et de quelques produits industriels), R. van Aubel. Revue de l'Industrie Minérale (Paris), no. 177, May 1, 1928, pp. 189–195, 8 figs. Qualitative analysis, how made; identification, minerals; alloys, colloidal materials; ceramic products. Bibliography.

METALS

Corrosion Resistance. Effect of the Testing Method of the Determination of Corrosion Resistance, H. S. Rawdon and E. C. Groesbeck. U. S. Bur. Standards—Tech. Paper, vol. 22, no. 367, Mar. 6, 1928, pp. 409–446, 25 figs. Determination of corrosion resistance of metals; tests were carried out on copper-nickel series, consisting of copper, nickel, and three copper-nickel alloys; methods tried out were simple immersion in non-aerated and aerated solutions repeated immersion both continuous and intermittent, spray, and accelerated electrolytic test.

Cutting. Determination of Cutting Power of Tools and Machine Tools (Bestimmung der Zerspanungsarbeit von Schneidewerkzeugen und Werkzeugmaschinen), G. Gerber. Werkstattstechnik (Berlin), vol. 22, no. 7, Apr. 1, 1928, pp. 185–188, 7 figs. Analysis of force components, of cutting operations, method of measuring these components details of Losenhausen measuring instruments and recording apparatus; results of tests; uses of such tests.

The Application of Oxygen and Hydrogen to Industrial Operations, F. P. Wilson. Gen. Elec. Rev., vol. 31, no. 5, May 1928, pp. 279–282, 1 fig. Selection of fuel gas for metal cutting; discussion of economic factors involved in selection of gas for this purpose; nature of cutting work classified; substitute fuel gases available; time study of cutting activities; cost of oxygen and source of supply; comparative tests on laboratory basis.

Flow. Effect of Average Principal Stress on the Flow of Metals (Der Einfluss der mittleren Hauptspannung auf das Fliessen der Metalle), W. Lode. Forschungsarbeiten auf dem Gebiete des Ingenieur-wesens (Berlin), no. 303, 1928, 15 pp. 12 figs. Reports of study, suggested by Nadai, made at Institute of Applied Mechanics of University of Goettingen; review of German, English, French and American work on plasticity of metals and on stresses causing metals to flow; author's original experimental study of flow of iron and copper; speed of flow of metals.

Forging Properties. Behavior of Metals and Alloys in Forging, W. L. Kent. Heat Treating and Forging, vol. 14, no. 4, Apr. 1928, pp. 393–398, 5 figs. Investigations made on aluminum, copper and brasses are described showing properties of these materials during and after hot working; forging test as measurement of malleability at high temperatures investigated mechanism of hot forging; effect of quenching hot-forged samples effect of annealing cold-worked samples.

Pickling. Practical Features of Pickling, W. G. Imhoff. Iron Trade Rev., vol. 82, no. 19, May 10, 1928, pp. 1206–1209, 10 figs. Pickling for black tinning, tinning of copper and enameling; tinning of copper is delicate operation and requires care and skill in pickling; cleaning solution; nitric acid used for pickling copper; crate which will revolve and allow acid to attack every part of steel or baskets or crates which can be raised easily and articles turned.

X-Ray Analysis. X-ray Inspection in the Machine Shop. Machy. (Lond.), vol. 32, no. 815, May 24, 1928, pp. 233–235, 9 figs. New X-ray inspection device profitably used in machine shop; X-rays produced at 100,000 volts may penetrate inch of steel, several inches of aluminum or foot or more of wood; X-ray detects internal defects in castings; cost of equipment required for X-ray inspection which consists of high-voltage power plant capable of producing 280,000 volts, X-ray tube mounted on lead-covered steel drum and exposure cabinet with movable lead screens.

MILLING MACHINES

Multiple-Spindle. Two Mechanical Giants (Zwei Maschenen-Riesen). Werkstattstechnik (Berlin), vol. 22, no. 7, Apr. 1, 1928, pp. 200–201, 3 figs. Brief description of multiple-spindle milling machine, 24 m. milling length, 28 m. table length and 4.5 m. span between uprights, manufactured by Schiess-Defries A.G. for Russia; also description of 110-ton vertical boring and turning machine of 8 m. turning diameter, manufactured by same firm.

MOTOR TRUCKS

Crawler-Type Drive. Maccar Truck Fitted With Flexible Crawler-Type Rear Drive. Automotive Industries, vol. 58, no. 18, May 5, 1928, p. 702, 2 figs. Truck with flexible crawler-type rear drive which embodies V-section rubber track; mechanism comprises Timken worm-drive rear axle equipped with grooved wheels in place of road wheels; pair of similarly grooved idler wheels placed in rear of driving wheels, and two rubber tracks passing around pair of wheels; hook-up to frame; seven-speed transmission.

Design. Design and Its Influence on Maintenance Costs, F. H. Paul. Automobile Engr. (Lond.), vol. 18, no. 241, May 1928, pp. 185–188, 6 figs. Suggestions of design requirements, fulfilment of which would certainly improve lot of maintenance engineer; chassis frame; front axle; sufficient attention not paid to springing; engine designed to be removed whole; clutch; oil strainers; gear box; universal joints; rear axle; brakes; wheels; undershields; mileage recorder.

N

NICKEL-COPPER ALLOYS

Effect of High Steam Temperatures on. Change Occurring in a Nickel-Copper Alloy in Superheated Steam of 350 to 400 deg. (Altération profonde d'un alliage nickel-cuivre dans la vapeur d'eau surchauffée vers 350 à 400 deg.), J. F. Saffy. Académie des Sciences—Comptes Rendus (Paris), vol. 186, no. 17, Apr. 23, 1928, pp. 1116–1118, 3 figs. Effects produced by exposing alloys for several weeks to steam temperatures of 350 to 500 deg.; investigations were made with view to selecting best material for steam-turbine blades.

NICKEL STEEL

Properties. The Properties of Nickel Steels, With Special Reference to the Influence of Manganese, J. A. Jones. Iron and Steel Inst. (Lond.)—Advance Paper, no. 8, May 1928, 36 pp., 20 figs. Steels containing carbon 0.2 to 0.55 per cent and nickel 3 to 12 per cent were examined; with low manganese contents there is no advantage in increasing nickel beyond 6 per cent; effect of manganese up to 0.8 per cent is small; manganese has marked influence on mass effect in 3 to 4 per cent nickel steel; bibliography. See Iron & Coal Trades Rev., vol. 116, no. 3141, May 11, 1928, p. 706, and Foundry Trades Jl., vol. 38, no. 613, May 17, 1928, p. 362.

P

PIPE JOINTS

New Method. A New Method of Making Joints, E. E. Thum. Iron Age, vol. 121, no. 19, May 10, 1928, pp. 1305–1308, 5 figs. New automatic method of making gas-tight joints in fitted assemblies of smaller steel parts developed by General Electric Co.; assemblies of simple parts, snugly fitted, are heated in hydrogen atmosphere; powdered copper, painted on, runs into joint, alloys, and makes tight weld; hydrogen atmosphere cleans steel and protects copper; smaller furnaces for intermittent work; metallurgical considerations.

PNEUMATIC TOOLS

Testing. Apparatus and Methods for Testing Compressed-Air Machines (Pruefmethoden und Messvorrichtungen fuer Pressluftmaschinen), E. Pallas. Zeit. des Oesterr. Ingeieur- u. Architekten-Vereines (Vienna), vol. 80, no. 19–20, May 11, 1928, pp. 162–166, 9 figs. Reviews papers by Wilson and Pallas on methods and apparatus for testing of pneumatic riveting hammers and similar tools; calibration of testing of friction brakes.

POWER PLANTS

Instruments. Power House Measurements. World Power (Lond.), vol. 9, no. 53, May 1928, pp. 290–292, 5 figs. Automatic control systems; feedwater regulators; steam flow meters; indicating and recording instruments; water-measuring devices.

POWER PLANTS, HYDROELECTRIC

Data on. Some Remarks on Hydroelectric Stations (Quelques remarques sur les centrales hydrauliques), V. Clerin. Union des Ingénieurs Sortis Des Ecoles Spéciales De Louvain—Bul. Technique (Louvain), vol. 55, no. 1928, pp. 73–86, 13 figs. Discusses radius of action of

hydroelectric plants and variation of power in course of year; efficiency of plant; charges for hydraulic kw-hr.

Maryland. Conowingo Hydro-electric Development. Power Plant Eng., vol. 32, no. 11, June 1, 1928, pp. 632–638, 9 figs. Exceptional speed of construction is feature of great Susquehanna River development; first units on line 3 months ahead of scheduled time; with initial installation of 378,000 hp. in seven main units ultimately to be increased to 594,000 hp. in 11 units, Conowingo development ranks as one of largest hydroelectric projects in United States.

Operation. Operation and Maintenance of Hydroelectric Power Plants (Die Betrieb und die Instandhaltung von Wasserkraftanlagen), F. Kammerer. Zeit. des Bayerischen Revisions-Vereins (Munich), vol. 32, nos. 7 and 9, Apr. 15 and May 15, 1928, pp. 77–80 and 109–112. General analysis of factors in operation of hydroelectric plants; silting, cavitation of turbine parts, resonance vibrations in power machinery and other causes interfering with operation; general rules of operation and maintenance.

Quebec. The Paugan Falls Power Plant. Engineer (Lond.), vol. 145, no. 3774, May 11, 1928, pp. 522–524, 7 figs. One of largest hydroelectric enterprises on North American continent; project is part of unified plan for intensive development of power and wood resources of Gatineau River; designed for ultimate capacity of 470,000 hp. and initial output of 272,000 hp.; provision has been made in dam structure for fourteen 17-ft. penstocks; main dam is about 1000 ft. long.

Trash Racks, Electric Heating of. Electric Heating of Rack Bars in Hydro-Electric Plants. Eng. Jl. (Montreal), vol. 11, no. 5, May 1928, pp. 330–331. Discussion of paper by C. R. Reid published in Apr. 1928, issue of same journal.

POWER PLANTS, INDUSTRIAL

Interconnection. Economies of Combining Industrial Power Plants, W. W. Gaylord. Power Plant Eng., vol. 32, no. 10, May 15, 1928, pp. 551–555. Advantages to be gained by providing central power and heating plant for several adjacent industries are set forth; as example of possible gains of such system, four plants grouped on bank of small stream are considered, namely, light textile plant, machine-tool plant, textile plant using large amount of process steam and metal-working plant using no process steam.

POWER PLANTS, STEAM

High-Pressure. Solvay Process Company Uses High Pressure. Power Plant Eng., vol. 32, no. 7, Apr. 1, 1928, pp. 401–402, 2 figs. Probably most interesting industrial power plant has yet been installed is at Solvay Process Co., Solvay, N. Y.; installation consists of two combustion steam generators with Elesco superheaters, Copes feedwater regulator and Hydrojet ash conveyors, supplying steam to Westinghouse 4750-kw. turbines, operating against back pressure of 125 lb.; ashes removed by water sluice; this installation in industrial field ranks in importance with initial 1200-lb. installation at Edgar and Lakeside.

POWER PLANTS, STEAM AND GAS

Combined. A Combined Boiler and Producer Plant, C. Longenecker. Blast Furnace and Steel Plant, vol. 16, no. 5, May 1928, pp. 642–645, 4 figs. Steam and gas generated in central building at Sharon Steel Hoop Co.; arrangement assures sufficient service and is economically attractive; coal-handling equipment; method of firing boilers with powdered coal; gas-producer department; boiler and gas-house equipment; labor required at producers and boilers; electric control.

Paper Mills. Process Steam for Paper Mill Produced by Hog Fuel and Oil, P. Sandwell. Power, vol. 67, no. 20, May 15, 1928, pp. 849–852, 4 figs. At newsprint plant of Powell River Co., Powell River, B. C., modern 12-boiler plant supplies daily 5,000,000 lb. of process steam to paper mill; all necessary power is generated hydroelectrically; hog fuel, burned in Dutch ovens on either flat or inclined grates, supplied 30 per cent of steam and rest is supplied by fuel oil, burners being mounted on rear wall of common combustion chamber.

POWER PLANTS, STEAM-ELECTRIC

Ash Handling. Recent Progress in Methods of Ash Handling in Power Plants (Die neuere Entwicklung der Einrichtungen und Anlagen zur Entaschung von Kraftwerken), Neumann. Brennstoff- und Waermewirtschaft (Berlin), vol. 10, no. 3, Feb. (1st no.) 1928, pp. 54–56, 6 figs. Describes recent types of scraper and bucket conveyors, pneumatic and hydraulic methods for removal of ashes, representing modern European and American power-plant practice.

Coal Handling. Progress in Methods of Transportation and Handling of Coal in Steam Power Plants (Neuerungen in Umschlags- und Verteilungseinrichtungen fuer Kohle in Dampfkraftwerken), H. Hermanns. Brennstoff- und Waermewirtschaft (Berlin), vol. 10, no. 3, Feb. (1st no.) 1928, pp. 47–54, 10 figs. Describes modern German practice in handling coal arriving by rail or by water; coal-handling installations of Klingenberg (Berlin), Tiefstack (Hamburg), Amme-Luther (Brunswick) and other recent steam-electric plants.

Coal Storage. Methods of Storing Coal (Zur Frage der zweckmaessigsten Kohlenlagerung), M. Schmelzer. Brennstoff- und Waermewirtschaft (Berlin), vol. 10, no. 3, Feb. (1st no.) 1928, pp. 59–63, 4 figs. Describes bunker arrangement of Tiefstack (Hamburg) power plant; details of gage for indicating level of coal stored in bunker.

Detroit. The Trenton Channel Station of the Detroit Edison Co. Engineering (Lond.), vol. 125, nos. 3250 and 3251, Apr. 27 and May 4, 1928, pp. 499–502 and 532–536, 42 figs. (partly on p. 512 and supp. plate). Apr. 27: Details of boiler plant; length of 263 ft. 8 in. is occupied by boilers now installed, with room for extension in future; there are 11 boilers in service of Stirling W type, working nominally at 420 lb. pressure. May 4: Plant was first large station to be equipped with Cottrell system of flue-gas cleaning; piping system and control of boilers is by hand.

The Trenton Channel Station of the Detroit Edison Co. Engineering (Lond.), vol. 125, nos. 3253 and 3254, May 18 and 25, 1928, pp. 603–606 and 629–631, 22 figs. partly on p. 608 and supp. plate. May 18: Details of turbine house; main units supplied by General Electric Co., of Schenectady, running at 1200 r.p.m.; main generators also by General Electric Co.; first three are rated at 62,500 kva., at 80 per cent power factor, at speed of 1200 r.p.m. and generate 3-phase, 60-cycle current at 12,200 volts. May 25: Auxiliary electrical supply.

Germany. The Cuno High-Pressure Steam-Electric Plant at Hagen in Westphalia [Das Cunowerk, ein Hochdruckdampfkraftwerk des Kommunalen Elektrizitaetswerkes Mark A. G. Hagen (Westfalen)], O. L. Kollbohm. Elektrizitaetswirtschaft (Berlin), vol. 27, no. 455, Apr. 1, 1928, pp. 153–163, 23 figs. Plan and sections of power house; details of conveying equipment; boiler plant (four Babcock and Wilcox sectional boilers, 1200 sq. m. heating surface each), furnaces, ventilators, 27,500-kva. turbo-generator, control apparatus, resistance thermometers, etc.

Holland, N. J. Holland Plant, N. J. to Operate at 1200 Lb. Pressure. Power, vol. 67, no. 21, May 22, 1928, pp. 932–933. New Jersey Power & Light Co., is building first 50,000-kw. unit of 200,000-kw. ultimate-capacity plant on Delaware River, 8 miles below Easton, Pa.; boiler units are being built for 1400-lb. steam pressure; pulverized fuel will be used from bin system; 50,000-kw. turbine will be of cross-compound type.

River Bend, N. C. $12,000,000 Unit of Power Project. Mfrs. Rec., vol. 93, no. 21, May 24, 1928, p. 65, 1 fig. Steam plant of Duke system to be located on Catawba river in North Carolina; one of largest steam stations in southeast; its ultimate capacity probably to be 600,000 hp. in 8 units of 75,000 hp. each; each turbine will be of single-cylinder, impulse-reaction type, operating at 1800 r.p.m.

St. Louis. Operating Experience With Latest Section of Cahokia Station, E. H. Tenney and H. G. Thielscher. Power Plant Eng., vol. 32, no. 11, June 1, 1928, pp. 600–606, 6 figs. Fifth unit, with capacity of 50,000 kw., brings total capacity to 195,000 kw.; unit mills and air preheaters used with new boilers; station was designed for low-grade and low-priced southern Illinois coal; fifth unit is bled at four points; raw-water heat exchanger used with generator air-cooler system in summer; grinding 65 per cent through 200 mesh appears most satisfactory. See editorial comment, pp. 646–647.

Toronto, Ont. Toronto Station Doubles Generating Capacity, G. S. Coffin. Power Plant Eng., vol. 32, no. 11, June 1, 1928, pp. 613–620, 7 figs. Performance record for 2½ years shows steady improvement to present low value of 15,000 B.t.u. per kw. sendout; in 1927, first extension was completed, increasing capacity of station 33,000 kw.; auxiliary turbine for this unit is 2000-kw. machine, and two boilers with total heating surface of 21,620 sq. ft. each; in 1928 fourth 33,000 kw. turbine, 2000 kw. auxiliary turbine and two additional boilers will be installed.

PRESSURE REGULATORS

New Type. A New Pressure Regulator. AEG Progress (Berlin), vol. 4, no. 4, Apr. 1928, p. 118, 2 figs. Pressure regulator suitable for controlling pump and compressor motors with outputs up to 2 hp. on 190 to 500-volt supplies; standard arrangement of contacts is three-pole, but for d.c. circuits, two pairs of contacts are connected in series, one type switching in and out at pressure of 1 and 1.7 atmos. respectively and the other at 2 and 3.5 atmos. switching at higher or lower pressure effected by correspondingly altering tension of main spring.

PRINTING PRESSES

Manufacture. Recent Progress in Construction of Printing Presses (Die neuere Entwicklung der Druckmaschinen), H. Fritz. V.D.I. Zeit. (Berlin), vol. 72, no. 20, May 19, 1928, pp. 657–663, 24 figs. partly on supp. plate. Construction of modern types of printing presses and appurtenances for three kinds of printing: relievo, intaglio and lithographic; modern high-speed newspaper printing presses in America and Europe; special presses for printing halftone and colored illustrations; offset printing.

PUMPS, CENTRIFUGAL

Installation. The Installation of Centrifugal Pumps, J. H. Jones. Blast Furnace and Steel Plant, vol. 16, no. 5, May 1928, p. 649. Correct procedure in installing and operating centrifugal pumps to secure efficient and satisfactory service.

R

RAILWAY MOTOR CARS

Diesel-Electric. Diesel Oil Electric Train Development. Modern Transport (Lond.), vol. 19, no. 478, May 12, 1928, pp. 3–4, 9 figs. Four-coach unit converted from electric rolling stock into Diesel oil-electric train for London Midland and Scottish Railway; Beardmore patent quick-running oil engine; pressure lubrication; d.c. English Electric traction-type generator coupled to Beardmore patent crude-oil engine; two traction motors mounted on truck of trailing end or power coach; control gear.

Gasoline Electric. Gas-Electric Car, Manitoba Power Co. Can. Ry. and Mar. World (Toronto), no. 363, May 1928, pp. 249–250, 2 figs. Known as type AS; electric generator, driven by engine is of 5-kw. capacity; motors on power truck are suspended by patented Mack rubber shock insulators.

Gas-Electric Unit for Rail Cars. Ry. Mech. Engr., vol. 102, no. 5, May 1928, pp. 250–253, 10 figs. High-compression, compact engine operated at full torque at varying speeds; cooling system and electric control carefully worked out; important features of gas-electric unit designed and put in service by Mack International Motor Co., Plainfield, N. J.; construction of base; unit rests on four rubber cushions; features of engine; six-cylinder Mack AP model engine, develops at 1800 r.p.m., 152 b.hp.; cooling system; control; electrical equipment; main generator rating of 95 kw.

Oil-Electric. 500 B.H.P. Oil-Electric Train. Engineer (Lond.), vol. 145, no. 3774, May 11, 1928, pp. 514–516, 8 figs. partly on p. 518. Description of new oil-electric train which, after undergoing official inspection by London, Midland and Scottish Railway officials, ran successful trial between Manchester and Blackpool; oil-engine-driven generator set is housed in first coach forward of luggage compartment; engine is of 8-cylinder unit of Beardmore all-steel quick-running type.

ROLLING MILLS

H-beam. Mill to Roll New Carnegie Beams, S. G. Koon. Iron Age, vol. 121, no. 20, May 17, 1928, pp. 1380–1385, 8 figs. Mills of Homestead Works of Carnegie Steel Co.; bloomer and three stands designed for huge tonnage; automatic control of screwdowns; 26 acres covered under one roof; large electric units required; flexible control for soaking pits; great length of H-beam mill layout; stiff support to rolling members; handling steel in and from mill.

Roller Bearings. Timken Roller Bearings for Steel Mills, F. Waldorf. Blast Furnace and Steel Plant, vol. 16, no. 5, May 1928, pp. 611–614, 5 figs. Information is presented from tests run on 22-in. bar mill, 10-in rod mill, 26-in. tube mill and 4-high mills; lubrication and life of bearings considered; loads determined by Brinell tests; bearings on tube mills; life from anti-friction bearings; Abstract of paper read before Engrs. Soc. of West. Penn.

Strip Mills. Developments in the Rolling of Strip Steel (Ueber Vierwalzengerueste). V.D.I. Zeit. (Berlin), vol. 92, no. 7, Feb. 18, 1928, p. 201, 2 figs. Use of single supporting and driving rolls placed above and below working rolls, has been applied to steel-strip rolling plant on large scale with great success; four-roll mill is employed both for hot and cold rolling. See

translated abstract in Metallurgist (supp. to Engineer, Lond.), Apr. 27, 1928, p. 59, 1 fig.

ROTORS

Inertia. Measuring Moments of Inertia of Heavy Rotors, H. W. Ritchie. Engineering (Lond.), vol. 125, no. 3253, May 18, 1928, pp. 614–615. Refers to article by Wall in Feb. 24 issue of same journal; describes two methods which are sufficiently accurate for general problems of acceleration, and are essentially practical and speedy.

S

SAND, FOUNDRY

Testing. The Influence of Ferric Hydrogel in the Bond of Natural Molding Sands, C. C. de Witt and G. G. Brown. Am. Foundrymen's Assn.—Reprint, no. 28-16, for mtg. May 14, 1928, pp. 247–276, 9 figs. Reports quantitative data showing relation of colloidal ferric oxide absorbed on sand grains and on clay bonding material to strength of bond in molding sand; effect of colloidal iron oxide on bond of molding sands determined by analytical methods on natural sands; and by synthetic methods successfully reproducing bond of natural molding sand by proper combination of clean unbonded sand or silica kaolin and ferric hydrosol.

STEAM

Measurement. An Accurate Method of Measuring Steam (En noggran angmatningsmethod), A. Harlin. Ingeniors Vetenskaps Akademien (Stockholm), no. 18, 1928, 42 pp., 80 figs. partly on supp. plates. Describes various methods of measuring steam; Oldquist's is admittedly most accurate method of all; simple modification of Oldquist method to facilitate its use without considerable decrease in accuracy.

STEAM ACCUMULATORS

Flash-Type. High-Pressure Flash-Type Accumulator, C. M. Garland. Power, vol. 67, no. 23, June 5, 1928, pp. 1014–1015, 2 figs. Designed primarily for high pressures, with water divided up into large areas of small volume, this accumulator flattens out sudden and intermittent demands for steam, such as are imposed by steam hammers, hoisting and rolling-mill engines, maintains uniform load on boilers and reduces boiler capacity otherwise necessary for this class of work.

STEAM CONDENSERS

Design. Economic Condensation for Power Plants (Kondesatwirtschaft fuer Kraftanalgen), Blacke. Waerme (Berlin), vol. 51, nos. 14 and 15, Apr. 7 and 14, pp. 260–268 and 281–285, 26 figs. Discusses conditions underlying design and construction of modern steam condensers, and describes modern condensation plants and their auxiliaries.

STEAM ENGINES

Marine, Bauer-Wach System. Recent Developments of the Exhaust-steam Turbine, G. Bauer. Shipbldr. (Newcastle-on-Tyne), vol. 35, no. 213, May 1928, pp. 336–341, 8 figs. Experience in manufacture of gearing, of elastic couplings, and of vibration phenomena in rotary systems, has made possible combination of piston engine, and exhaust turbine on one propeller shaft; draws attention to features of such combination, known as Bauer-Wach system. Paper read before Instn. Engrs. & Shipbldrs. in Scotland.

STEAM GENERATORS

Electric. Steam Generation—Electric Boilers and Steam Accumulators, C. J. Wharton. World Power (Lond.), vol. 9, no. 53, May 1928, pp. 256–260, 4 figs. Shows that in circumstances of very cheap current, steam generation for process purposes by use of electric boilers is economic proposition; after considerations of conversion efficiency, cleanliness, compactness, and absence of attendance costs, follow advantages of combining use of steam accumulators with steam production by electricity. Abstract of paper read before Instn. Eng. Inspection.

STEAM TURBINES

Design. Practical Experiences With Steam Turbines (Betriebserfahrungen mit Dampfturbinen), F. Gropp. Waerme (Berlin), vol. 51, no. 13, Mar. 31, 1928, pp. 230–231. Discusses materials and shape of blades; important details proper starting and overload capacity.

High Pressure. Modern High-Pressure Steam Turbines (Neue Hochdruckdampfturbinen), P. Bach. Waerme (Berlin), vol. 51, no. 18, May 5, 1928, pp. 335–339, 4 figs. Bergmann Elektricitaets-Werke A.G. have developed types of turbines which act as standard machines in cases where there is sufficient reserve of power available, and which, with slight alterations, can also be used as special standby machines, in cases where there is not enough reserve power.

STEEL

Case-Hardening. A New Free-Cutting Case-Hardening Steel. Machy. (Lond.), vol. 32, no. 814, May 17, 1928, pp. 213–214. Samples of new mild steel under name of Jalcase have been tested at City of Birmingham Industrial Research Laboratories and results of these tests, together with comments made thereon are reproduced.

Chromium. See CHROMIUM STEEL.

Nickel. See NICKEL STEEL.

STEEL CASTINGS

Heat Treatment. How a Milwaukee Plant Heat Treats Miscellaneous Steel Castings, A. W. Lorenz. Iron Trade Rev., vol. 82, no. 20, May 17, 1928, pp. 1269–1272, 7 figs. Experience of Bucyrus-Erie Co. with heat-treated steel castings; one-third of foundry's output is quenched and tempered in electrically heated furnaces having novel charging devices; furnaces and equipment used; loading racks; entire cycle, including opening of doors, handled by one man on platform of charging machine.

Casting Temperature. Casting Temperature and Speed (Ueber Giesstemperature und Giessgeschwindigkeit), F. Beitter. Stahl u. Eisen (Duesseldorf), vol. 48, no. 18, May 3, 1928, pp. 577–583 and (discussion) 583–585, 11 figs. Points out that casting temperature is in close relationship with casting speed; determination of melting temperature in furnace; cooling of steel to proper casting temperature; temperature drop of steel while in ladle; control of casting speed.

STEEL, HEAT TREATMENT OF

Electric. Hardening and Tempering by Electricity. Heat Treating and Forging, vol. 14, no. 4, Apr. 1928, pp. 400–404. Heat treatment and application of electric heat as medium; various data gathered from existing installations given for guidance in selecting equipment; explanation of metallographic terms; operating data; electric lead-pot furnace energy computation; tempering tool steel; types of electric furnaces. Abstract of serial report of Industrial Heating Committee 1926–1927, Nat. Elec. Light Assn.

STRAIN GAGES

Maihak. New Maihak Acoustical Strain Gage. Instruments, vol. 1, no. 5, May 1928, pp. 251–252, 2 figs. Designed to measure strain and accompanying stress induced in machine parts (flywheels, propellers, shafts), steel structures, foundations, bridges, etc., acted upon by live loads or superimposed loads and dynamic forces.

T

TEXTILES

Cotton Fabric, Strength Testing of. The Results of Various Strength Tests on the Fabrics, W. E. Morton and J. A. Turner. Textile Inst.—Jl. (Lond.), vol. 19, no. 5, May 1928, pp. T189–T222, 10 figs. Eighty-one fabrics were tested for strength and extensibility; paper description of these tests and of machines used therein including new machine for determination of resistance to wear and to discussion of results obtained; previous works; experimental details; general conclusions.

TOLERANCES

Skoda vs. D.I.N. System. Is an International Tolerance Standard Possible? (Ist Internationale Vereinheitlichung der Passysteme moeglich?) Werkstattstechnik (Berlin), vol. 22, no. 8, Apr. 15, 1928, pp. 217–260, 5 figs. Symposium containing paper on Skoda tolerance system, by its originator N. N. Sawin; also number of discussions and reports from machine-building, automobile-manufacturing and other plants on working of German D.I.N. and Skoda tolerance systems in practice.

TOOLS, METAL-CUTTING

Chromium Plating. Chromium - plating Metal-working Tools, P. Cattucci. Machy. (N. Y.), vol. 34, no. 10, June 1928, pp. 764–766 2 figs. Hardness of chromium plate; chromium plated cutting tools show greatly increased resistance to wear; dies and metal-spinning tools; building up worn plug gages; experience is necessary factor; cleaning work to be plated; electric-current requirements; cost of chromium plating.

High-Speed, Testing. Endurance of High-Speed Cut-off Tools in Relation to Magnetic and Other Measurements, H. Styri. Am. Soc. Testing Matls.—Reprint, no. 30, for mtg. June 25, 1928, 10 pp. Number of standard cut-off tools hardened in groups from different temperatures have been used in cutting off rings of high-carbon chromium steel having Brinell hardness of about 180; magnetic and electric tests, and Rockwell hardness and duroscope readings were made on these tools, and relation between these values and number of rings cut per grind are shown; methods of measurement are described and possible reasons for irregularities in results are indicated.

New Metal for. New High-Speed Cutting-Tool Metals Interest British Metal Workers. Am. Mach., vol. 68 no. 21, May 24, 1928, p. 868b. Some records established by German and English products; metal cutting at unusually high speeds shown at recent Leipzig Fair; in Great Britain, new material B. V. introduced which can be heat treated and machined in much the same manner as ordinary 18 per cent tungsten high-speed steel.

TURBO-GENERATORS

Brown-Boveri. 20,000 Kw. Brown-Boveri Turbo - Generator at Rotterdam. Engineer (Lond.), vol. 145, no. 3774, May 11, 1928, pp. 506–508, 11 figs. and diagram on supp. plate. Three-cylinder turbo-generator installed in Schiehaven power station at Rotterdam has speed of 3000 r.p.m.; turbine was designed for steam at pressure of 170 lb. per sq. in. at stop valve, superheated to 350 deg. cent.

W

WAGES

Wage-Payment Plans. Gang System Almost Doubles Production per Man, P. V. Osburn. Management, vol. 30, no. 5, May 1928, pp. 50–55, 3 figs. Gang system of wage payment, used by Continental Motors Corp., reduced inspection force almost 50 per cent; however, quality of product is much higher than formerly as proved by fewer rejections under test and fewer complaints from users.

WATER TREATMENT

Developments. Developments in Water Treatment, J. R. Baylis. Contract Rec. (Toronto), vol. 42, no. 20, May 16, 1928, pp. 508–510. Progress made recently in science of water purification; public more appreciative of efforts of water-works engineers and chemists; improvements in mechanical equipment; proper chemical balance; hydrogen-ion test; mechanical mixers; settling basins; filter improvements; filter-bed troubles; improved instruments; aeration; excess lime treatment and recarbonation.

WELDING

Electric. See ELECTRIC WELDING.

Influence on Design. The Influence of Welding on Design, W. Hoenisch. Eng. Progress (Berlin), vol. 11, no. 4, Apr. 1928, pp. 111–116, 32 figs. Electric resistance welding; spot and line welding; most important kinds of fusion welding are: oxyacetylene and electric arc welding; in both processes, temperatures of more than 3000 deg. cent. are developed; 5432 deg. fahr.; welding replaces riveted joints; welding in aircraft and structural work; pipe welding; welded material to replace castings; padding.

WIRE

Steel-Drawing. Drawing Steel Alloy Wires, J. D. Brunton. Wire, vol. 3, no. 6, June 1928, pp. 187–190 and 210–211, 10 figs. Application of cold work to miscellaneous alloys and to high-speed and stainless steels; cold-working special steels as compared with ordinary carbon steels requires special precautions in cleaning, annealing and quenching; author's reports of alterations in structure are illustrated with photomicrographic sections of wires made from specified formula.

WOODWORKING PLANTS

Waste Elimination. Waste Reduction With Greater Unit Production in Woodworking Plants, C. M. Bigelow. Mfg. Industries, vol. 16, no. 1, May 1928, pp. 29–32, 3 figs. Six steps of prime importance in economical utilization of lumber previously discussed; remaining four steps are: determination of past average percentage of waste and production, decide on bonus and construct bonus chart, preparation of report outlining plan, and maintain graphic chart of results; improper piling and kiln drying causes considerable wastage of lumber.

THE ENGINEERING INDEX

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AERIAL TRANSPORTATION

Costs. Information as to Cost of Aerial Transportation, H. V. Shebat. Stone and Webster Jl., vol. 42, no. 6, June 1928, pp. 792–796. Planes which have been most successful in recent demonstrations; cost of operating airplane 200,000 mi., 250 round trips; aerial transportation is justified on basis of economy alone if it is required that eight persons travel over line in each direction each month.

AERODYNAMICS

Kinematic Studies. Kinematographic Studies in Aerodynamics, A. Klemin. Am. Soc. Mech. Engrs.—Aeronautics Division—advance paper for meeting, June 28, 29, 1928, pp. 217–222, 8 figs. Particulars regarding high-speed motion-picture methods employed at Tokyo Aeronautical Research Institute; early experiments in momentary photography and kinematography; high-speed kinematography.

AERONAUTICAL INSTRUMENTS

Design. Modern Developments in Aircraft Instruments, C. J. Stewart. Roy. Aeronautical Soc.—Jl. (Lond.), vol. 32, no. 210, June 1928, pp. 425–465 and discussion 465–481, 35 figs. Post-war developments in instrument design brought about by demand for more accurate measurement of aircraft performance; altimeters; air-speed indicators; statoscopes and climb meters; hot-wire rate of descent meters; inclinometers; gyroscopic turning indicators; engine thermometers; pressure gages; revolution indicators; fuel flow meter designed to measure mass flow; fuel-content gages; compasses; periscopic drift sight; tail drift sight.

AERONAUTICS

Military and Naval. Military Aviation, W. E. Gillmore. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 7 pp., 13 figs. Survey of development of engineering material for aviation uses, air-cooled engine, and bombing equipment; engine materials; laboratory performance and endurance tests of aircraft engines; standard Air Corps endurance test; attack and observation airplanes; radio communications.

AIRCRAFT

Cycloidal Propulsion. Cycloidal Propulsion Applied to Aircraft, F. K. Kirsten. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 21 pp. 20 figs. Observations on flight of gulls which indicated that wing top moves with cycloidal motion; analysis of this type of motion as it might be applied to propulsion of aircraft; various aspects of cycloidal propellers including their efficiency are discussed and their application to heavier-than-air and lighter-than-air craft is urged.

AIRCRAFT ENGINES

Crankshafts. Shaft Speeds, J. Morris. Automobile Engr. (Lond.), vol. 19, no. 242, June 1928, pp. 217–219, 5 figs. Analysis of best running conditions for aircraft-engine crankshafts; avoiding running speed which may approximate too closely to resonant speed; question of whether running speed should be above or below critical speed and if so by what amount; determining lightest shaft able to withstand stresses involved in running.

Exhaust Silencers. Engine Exhaust Silencers, R. M. Mock. Aviation, vol. 24, no. 25, June 18, 1928, pp. 1762–1763 and 1794–1798, 9 figs. Various designs of silencers developed to eliminate noise of exhaust; power loss decreased with proper design; silencer on Fairchild planes; Curtiss bayonet or cone type of exhaust-pipe opening; tests made on Liberty engine; muffler in Loening commercial amphibian of Venturi type combined with whirl type; Southern Airways muffler; ultimate muffler will be of Venturi type or long exhaust-pipe type fitted with special ends.

Fairchild-Caminez. The Development and Technical Aspects of the Fairchild Caminez Engine, H. Caminez. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 6 pp., 6 figs. Operation of drive-cam mechanism and general description of Fairchild Caminez engine; history of engine development; tests conducted and problems encountered; principles and method of drive-cam design.

Progress. Airplane Engine Designers Following Diverse Lines, A. F. Denham. Automotive Industries, vol. 58, no. 25, June 23, 1928, pp. 952–956 and 985, 7 figs. Experimental work undertaken by various aircraft-engine manufacturers discussed; progress made in air-cooled Vee and in line engines; chief problems involved are to obtain adequate cooling for rear cylinders and location of accessories so as not to interfere with cooling system; nearly all such engines are of inverted type; anti-friction bearings; serious effort made to lower production costs.

Radial. Radial Aero-Engine Design, R. W. A. Brewer. Soc. Automotive Engrs.—Jl., vol. 22, no. 6, June 1928, pp. 731–732, 1 fig. Design of radial air-cooled engines for commercial airplanes; differences in designs of military engines; radial engine with cylinders designed as large in bore as can be crowded around crankcase without piston interference and within reasonable overall diameter; for commmercial engine there is no substitute for cast iron. Abstract.

AIRCRAFT PARTS

Standardization. Many Changes Are Recommended in S.A.E. Standards. Automotive Industries, vol. 58, no. 26, June 30, 1928, pp. 1007–1009, 4 figs. Discussion of reports of Standards Committee of Soc. of Automotive Engrs., submitted at Quebec meeting, which were ratified with few exceptions; revisions made in small aircraft parts in accordance with latest Army-Navy practice.

AIRCRAFT MANUFACTURE

Gluing. Gluing Wood in Aircraft Work, T. R. Truax. Am. Soc. Mech. Engrs.—Aeronautic Division—advanced paper for meeting, June 28, 29, 1928, 3 pp., 3 figs. Glues used in aircraft construction; gluing operation and its application to different species of wood; recommendations for gluing of different woods with both animal and casein glues, with data on glue-water proportions, glue spread, temperature of wood, pressure to be applied to joint, and time should remain under pressure.

AIRPLANES

Manufacture. Applications of Balsa Wood in Aircraft, G. L. Weeks. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 3 pp. Balsa wood as it grows; comparison with other woods; extremely light weight; balsa used where strength is not all-important factor; properties in comparison with spruce; balsa wood in construction of airplanes; used in many industries as insulator in sound proofing and against heat or cold; future prospects of balsa in air transportation.

The Design of Commercial Airplanes, M. Short. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 3 pp., 3 figs. Commercial-airplane designs; intensive production methods not yet entirely applicable to machines manufactured in quantity but have possibilities; permissible expenditures to save pound in weight amount to from one to

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NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

two dollars; production problems and expenditures; progress in design and demands of flying public.

AIRCRAFT PROPELLERS

Reed. The Technical Development of the Reed Metal Propeller, S. A. Reed. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 10 pp. Reed aircraft propeller has solid, thin, and almost knifelike blades of forged or rolled duralumin, or other similar aluminum alloys; development of metal propellers; propeller and its function; advantage of Reed type over wooden propeller; types of Reed metal propeller; materials of construction; methods of manufacture; table of propeller stress calculation.

AIRPLANES

Protective Coatings. Protecting and Finishing Aircraft Structures, T. B. Colby. Aviation, vol. 25, no. 1, July 2, 1928, pp. 26 and 61–62, 4 figs. Commercial finishing practices for aircraft structures; finish for steel tubing for fuselage before assembling and welding; protection of exterior of welded unit; finish for duralumin tubing; treating metal flying boats and pontoons; finishes for all-metal planes; method of finishing all-metal wing construction.

Wing Flutter. An Introduction to the Problem of Wing Flutter, C. F. Greene. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 6 pp., 5 figs. The flutter defined and data accumulated as to conditions under which it occurs analyzed; particulars of study of torsional oscillations of airfoil and of position of elastic axis and location of center of mass of airplane wing; aerodynamic considerations involved in problem and present status of latter; purpose of paper is not solution for problem but to promote discussion.

Wings, Slotted. Slotted Wings, F. Handley Page. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 11 pp. Two courses open to designer in application of slot to airplane wing; way in which aerodynamic characteristics of wing section are altered by slot; wing completely slotted for its whole span; effect of slotting portion only of span; application of automatic slot for control purposes; tests carried out in wind tunnel; summary of results of research work.

AIRSHIPS

United States. The Status of the Airship in America, G. Betancourt. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 7 pp. Present year marks beginning of remarkable progress of the airship era; handicaps to development; airplanes versus airships; construction of Zeppelin; possible new Upson pressure rigid type of airship; merits of fabric or metal airships, efficiency of large or small airships; commercial military airships; helium or hydrogen; fineness ratio and form; tail surfaces; location of engines and cars, keels and cabins.

AIRWAYS

Weather Forecasting Stations. Meteorological Service for Commercial Airways, C. G. Rossby. Am. Soc. Mech. Engrs.—Aeronautic Division—advance paper for meeting, June 28, 29, 1928, 7 pp., 1 fig. Meteorological service for commercial airways to provide safety and efficiency in operation; airways meteorological organization should consist of dense net, not single string of stations; providing increased efficiency for air transportation between San Francisco and Los Angeles; D. Guggenheim Fund Experimental Meteorological Service for airways in Central and Southern California.

ALLOY STEEL

Manufacture. The Manufacture of Alloy Steel, E. C. Smith. Blast Furnace and Steel Plant, vol. 16, no. 6, June 1928, pp. 762–765, and 778. Alloy steel defined and procedure in its manufacture outlined; fuels and charge for open-hearth process; teeming practice and mold design; heating and rolling into blooms; problems of finishing mill operations; peculiarities of specifications. Paper presented before Am. Iron and Steel Inst.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.
Chromium. See CHROMIUM STEEL.
Copper. See COPPER ALLOYS.
Iron. See IRON ALLOYS.

ALUMINUM ALLOYS

Electroplating. Electroplating on Aluminum and Its Alloys, H. K. Work. Eng. and Min. Jl., vol. 125, no. 23, June 9, 1928, p. 931. Successful method developed by author; chemical etching in acid metal or acid dip; surface of aluminum is pitted by action of dip; immersion layer surface is formed which greatly facilitates plating; roughened metal is then immersed for first coat in nickel-plating bath, to which electric current is applied.

AUTOMOBILE ENGINES

Connecting Rods. Connecting Rods, C. B. Dicksee. Automobile Engr. (Lond.), vol. 18, no. 242, June 1928, pp. 208–210, 5 figs. Methods of determining correct and economical section of connecting rods for any set of conditions; H-section commonly adopted for automobile and aircraft engines may be made having widely different proportions and still fulfil conditions; variation of ratio of breadth of flange to depth of section of rod designed to carry given load.

Crankshafts, Honing. Crankshaft Honing. Automobile Engr. (Lond.), vol. 18, no. 242, June 1928, pp. 206–207, 1 fig. Method of Packard Motor Car Co. in finishing crankshaft journals and pins; details of Schraner honing machine; grain of stone; grade of abrasive and pressure of abrasive blocks on work are important factors; correct timing of honing process; speed of work; lubricant employed for flushing work and washing stones; constructional features of machine.

Rocket. The Rocket Engine and Its Consequences (Der Raketenmotor und seine Folgen), K. Baetz. Maschinen-Konstrukteur (Leipzig), vol. 61, no. 11, June 1, 1928, pp. 250–251, 4 figs. Theoretical principles and construction of Opel and other types of rocket engines operated by explosions (within cylinder open at one end) of leaf powder or of combustible charges; theoretical possibility of attaining acceleration of 20 m. per sec. per sec., speed of 1440 km. per hour in 20 sec. from start, which means covering distance between Europe and America in 3 hours.

AUTOMOBILE PLANTS

Layout. Line-Production Layout, C. R. F. Engelbach. Soc. Automotive Engrs.—Jl., vol. 22, no. 6, June 1928, p. 692. Principles adopted in layout of plant for continuous production: even gear-cutting and grinding machines are placed in their correct positions in spite of difficulties of supervision; enameling ovens usually installed in enameling department, are placed in line of operation wherever required. Abstract of paper presented before Instn. Automobile Engrs., Lond.

AUTOMOBILES

Brakes. Vacuum Brake for Motor Vehicles. Engineering (Lond.), vol. 125, no. 3255, June 1, 1928, pp. 667–668, 4 figs. Developed by Westinghouse Brake and Saxby Signal Co.; most important requirements of servo system are that comparatively light pressure on control pedal shall provide any braking effort required, that braking effort shall be in proportion to pressure.

Multiple Reactive Gears. Multiple Reactive Gears, E. K. Sandeman. Lond., Edinburgh and Dublin Philosophical Mag. and Jl. of Science (Lond.), vol. 5, no. 31, May 1928 (Supp. no.), pp. 946–958, 6 figs. This gear follows as logical outcome of theory of torque converter; plans of two mechanical networks with equivalent electric circuits are shown.

Rocket. Rocket Cars. Automotive Abstracts, vol. 6, no. 6, June 20, 1928, p. 170. German designers have constructed rocket-driven automobile; first test runs were undertaken on Opel track near Mannheim; it was found possible to accelerate car in eight seconds to speed of 62 m.p.h.; first cars and rocket ships will be propelled by explosives. Brief abstract translated from Flug, 1st. Apr. no., 1928, p. 155.

Springs and Suspension, Rubber. India-Rubber as an Auxiliary to Suspension, F. W. Lanchester. Automobile Engr. (Lond.), vol. 18, no. 242, June 1928, pp. 226–230, 14 figs. Experiments with india rubber and its application in connection with suspension of automobiles; physical properties of india rubber; modulus of elasticity; coefficient of restitution; deformation permissible determines energy which may be stored; bouncing or dropped-ball test; coefficient of rebound of balls; oscillating-beam experiments consisting in compressing samples actually in testing machine.

Standardization. Many Changes Are Recommended in S.A.E. Standards. Automotive Industries, vol. 58, no. 26, June 30, 1928, pp. 1007–1009, 4 figs. Discussion of reports of Standards Committee of Soc. of Automotive Engrs., submitted at Quebec meeting which were ratified with few exceptions; revisions made in small aircraft parts in accordance with latest Army-Navy practice.

Transmission Gears, Progress. Internal Gear Outstanding Transmission Development, S. O. White. Automotive Industries, vol. 58, no. 25, June 23, 1928, pp. 938–941. Internal gear seems destined to displace conventional spur-gear set; latter has not been neglected, improvements having made it more compact, stronger, quieter, and also lower in price; failure of many designs due to lack of rigid support in internal train; forging, normalizing and annealing; laws of involute tooth better understood; developments coming fast.

B

BAKELITE

Molding. Bakelite Moulding Methods, R. A. Lowe. Machy. (Lond.), vol. 32, no. 816, May 31, 1928, pp. 259–263, 8 figs. Description of processes and appliances used in bakelite molding; presses used for molding in most cases are hydraulic; flash, positive, and positive flash molds; thread molding; undercuts and projections; recessing and coring; question of flow; trapped air; bakelite tests; table of mechanical and electrical properties of bakelite.

BEARING METALS

Research. Bearing Metals, E. C. Wadlow. Automobile Engr. (Lond.), vol. 18, no. 242, June 1928, pp. 221–225, 16 figs. Practical investigation of load-carrying properties of bearing metals; research dealing with materials and lubricants as they are obtained commercially; tests to obtain information regarding suitability of cold-drawn and extruded tubes for plain journal bearings; microstructure and general performance; correlation of bearing factors with chemical and physical properties.

Bronze, Testing. Wear and Mechanical Tests of Some Railroad Bearing Bronzes, H. J. French. Am. Soc. Testing Matls.—Preprint, no. 34, for mtg. June 25, 1928, 28 pp., 18 figs. Copper-tin-lead alloys, both chill-cast and sand-cast, were tested under friction, without lubrication at varying temperatures; generally, chill-cast bronzes were less resistant to wear and notched-bar impact than sand-cast bronzes, but more resistant to pounding and tension; increase in lead, particularly in range 0.25 to 10 per cent, improved wearing properties but lowered resistance to pounding impact, and tension; increase in tin improved all properties.

BEARINGS

Anti-Friction. Anti-Friction Bearings for Auxiliaries in the Iron and Steel Industry, E. S. Jefferies. Iron and Steel Engr., vol. 5, no. 6, June 1928, pp. 242–243. Reviews most prominent applications; adoption of anti-friction bearings in transportation equipment; ideal application for anti-friction bearings is on pinion and gear shafts of large mill gear reducing units.

Bronze. Bronze Bearings for Heavy Duty, N. K. B. Patch. Iron Age, vol. 121, no. 23, June 7, 1928, pp. 1599–1600. New conditions met by proper design and crystal structure for bearings; selecting right material; bearing is mixture of hard and soft crystals; harder bronzes are not only improvement but are essential to long life; laboratory control necessary; too many oil grooves a common error; every oil groove in bearing reduces bearing area; oil groove should be well chamfered at its edges, so as not to scrape film from journal; vital factors in design of bearings.

Journal. The Effect of Running In on Journal-Bearing Performance, S. A. McKee. Mech. Eng., vol. 50, no. 7, July 1928, pp. 528–533, 4 figs. Discussion of paper published in Mech. Eng., Dec. 1927, p. 1335, describing investigation at Bureau of Standards, object of which was to evaluate effect of running in upon performance of babbitted, full-journal bearings.

Modern Methods for Testing of Bearings (Die neuzeitliche Lagerprüfung), E. v. Ende. Zeit. für technische Physik (Leipzig), vol. 9, no. 4, 1928, pp. 121–126, 7 figs. Reviews theory of journal friction; principles of apparatus for testing of journal friction with special reference to Kammerer and Vieweg designs.

BINARY MIXTURES

Vapor Pressures. The Vapor Pressures of Binary, A. W. Porter. Faraday Soc.—Trans. (Lond.), vol. 24, part 6, June 1928, pp. 343–347, 2 figs. Substitution of vapor pressures for masses (or molar fractions) leaves problem of reactive equilibria unsolved; vapor-pressure equations developed in this paper are an attempt at supplying lacking information; "dilute" liquid systems are sometimes taken to have same simplicity as imperfect gaseous systems, but if system is dilute in regard to one constituent it is very concentrated in regard to other.

BOILER CODE

Italy. The Boiler Code of Italy (Italienische

Dampfkesselvorschriften). Archiv für Wärmewirtschaft (Berlin), vol. 9, no. 5, May 1928, pp. 159–160. Extract from text of official code on construction and testing of boilers and steam vessels; notes differences between Italian and German codes.

BOILER FURNACES

Firing Systems. Practice and Progress in Combustion of Coal as Applied to Steam Generation, F. H. Rosencrants. Fuel (Lond.), vol. 7, no. 6, June 1928, pp. 272–281, 2 figs. Position of pulverized-fuel firing in relation to stoker firing; discusses two systems of pulverized-coal firing, bin-and-feeder and unit system; traveling-grate stokers and stoker furnaces; ash problem. Abstract of paper read before Instn. Elec. Engrs.

Fuel Economy. Low Grade Heat Proclamation, W. D. Wylde. Eng. and Boiler House Rev. (Lond.), vol. 41, no. 12, June 1928, pp. 577–579, 3 figs. Author discusses heat-recovery methods; fuel economy resulting from increased combustion efficiency based on decrease in excess-air heat loss with fuel heat value of 11,000 B.t.u. per lb. as fired, would be 0.6 per cent; it is evident that increase in boiler-plant efficiency is per cent fuel saving times ratio of steam to fuel heat, from which it will be seen that the lower the boiler efficiency the lower the increase in overall efficacy of steam production.

Pulverized Coal. Practice and Progress in Combustion of Coal as Applied to Steam Generation, F. H. Rosencrants. Eng. and Boiler House Rev. (Lond.), vol. 41, no. 12, June 1928, pp. 594–597, 3 figs. Extracts from paper read before Instn. Elec. Engrs. previously annotated. Present abstract deals only with section of paper dealing with pulverized-coal firing. See also Editorial comments pp. 575–576, 1 fig.

Refractory Materials, Testing. Fire Brick for Boiler Furnaces, W. A. Carter. Blast Furnace and Steel Plant, vol. 16, no. 6, June 1928, p. 816. Tests and investigations advisable in selecting proper refractory for boiler-furnace walls are outlined; methods for making up specifications described. Abstract of paper from Am. Refractories Inst.—Tech. Bul. 22.

Testing Refractories for the Furnace, W. B. Mitchell. Blast Furnace and Steel Plant, vol. 16, no. 6, June 1928, p. 815. Responsibility of manufacturer of firebrick and of purchaser in selecting appropriate brand is defined and suggestions offered.

BOILER PLATES

Temperature Effect. The Properties of Materials for Use at High Temperatures With Special Reference to Boilers for Superheated Steam, R. G. C. Batson. Engineering (Lond.), vol. 125, no. 3256, June 8, 1928, pp. 723 and (discussion) 702–703. It has been found that at high temperature, stress much lower than ultimate tensile stress will cause failure of any materials if prolonged for some time; this is due to creep or flow of material with time; for each temperature there is stress below which material will not fail or will last for many years; this is called limiting creep stress. Abstract of paper read before Instn. Civil Engrs. See also Engineer (Lond.), vol. 145, no. 3779, June 15, 1928, p. 652.

BOILERS

Design. The Present Trend in Boiler Practice, W. H. Patchell. Engineering (Lond.), vol. 125, no. 3256, June 8, 1928, pp. 723–724 and (discussion) 703–704. Modern tendency appears to be development of still larger steam-generating units, which will utilize to better advantage space they occupy, and of still higher steam pressures to meet more exacting demands of steam cycles that are now becoming fashionable. Abstract of paper read before Instn. Civil Engrs. See also Engineer (Lond.), vol. 145, no. 3779, June 15, 1928, pp. 653–654.

Sweden Produces a New Steam Generator, N. Farsselad. Power, vol. 67, no. 24, June 12, 1928, pp. 1054–1055, 2 figs. Boilers of new design installed in Vasteras power station; first boiler is adapted for oil firing; second is arranged for pulverized-coal firing, and is internally fired, single-drum sectional unit; furnace is entirely surrounded by heating surface; oil-fired boiler is capable of raising steam very rapidly, full pressure can be obtained from cold state in 11 to 12 minutes; design again calls attention to fact that large furnace volumes are not so essential to boiler efficiency as so many assume.

High Pressure. High-Pressure Boiler. Times Trade and Eng. Supp. (Lond.), vol. 22, no. 517, June 2, 1928, p. 296, 1 fig. In design of new type of boiler for generation of high-pressure steam developed by Brown Boveri, leading points aimed at are reliability, low cost, possibility of considerable overload, insensibility to fluctuations of load, and low consumption at small load; to avoid heavy drums perforated by many holes for tubes and thick parts exposed to fire and to heat stresses, heat is transferred to steam in indirect way by means of superheated steam in tube coils of small diameter and thickness.

Locomotive. See LOCOMOTIVE BOILERS.

Waste Heat. Waste-Heat Boilers in the Steel Mill, R. H. Stevens. Iron Age, vol. 121, no. 23, June 7, 1928, pp. 1605, and (discussion) 1605–1606. Reclamation vs. improving primary unit; while generation of steam is very feasible way of recovering waste-heat energy, installation is apt to be one of most expensive, and ultimate results no better than those possible with less costly scheme; field wherein waste-heat boiler can make best showing is one wherein reclaimed energy is not required directly by process from which it came. Abstract of paper read before Am. Iron and Steel Inst.

BRAZING

Hydrogen. Brazing by the Hydrogen Process. Machy. (N. Y.), vol. 34, no. 11, July 1928, p. 813. Method of hydrogen brazing involves welding together of parts to be joined by means of copper flux and is result of considerable development work by General Electric Co.; by use of atmospheres of protective gas in electric furnaces, steel parts used in manufacture of complicated assemblies can be united by strong alloy weld. See also Automotive Industries, vol. 58, no. 24, June 16, 1928, p. 917, 1 fig.; and Brass World, vol. 24, no. 6, June 1928, pp. 188, 1 fig.

C

CADMIUM PLATING

Quantity Production. Cadmium Plating in Quantity Production, C. H. Loven. Metal Industry (N. Y.), vol. 26, no. 6, June 1928, pp. 252–255, 2 figs. Its value as protection against rust; description of methods of plating; means of control; analysis of cadmium-plating solutions.

CALORIMETERS

Gas. Gas Calorimeters, C. H. Lander. Times Trade and Eng. Supp. (Lond.), vol. 22, no. 518, June 9, 1928, p. 319. Report of investigation carried out with assistance of laboratory staff of Fuel Research Station of Thomas recording gas calorimeter; instrument is of American origin but in essential respects has been redesigned by Cambridge Instrument Co. Abstract from special report no. 20, Department Sci. and Indus. Research.

CAR COUPLINGS

Automatic. The Development of the Automatic Coupler in America, A. G. Williams. Baldwin Locomotives, vol. 7, no. 1, July 1928, pp. 25–31, 14 figs. History of development of automatic couplers; earlier couplers, made of crucible steel; art of designing and manufacturing automatic couplers has been developed to very high degree of perfection; numerous interesting methods of test are brought out; claimed to be most highly developed and perfected article now in use on American Railway rolling stock.

CARS, FREIGHT

Steel. Use of Copper Bearing Steel in Steel Freight Cars, J. S. Unger. Railroad Herald, vol. 32, no. 7, June 1928, pp. 27–31. Life of steel freight car is dependent upon several factors, among which are mechanical abrasion and corrosion; 100 hoppers and 100 gondolas built using copper-bearing steel in one-half body and plain steel in other half of same car; tables give average thickness of two kinds of steel in similar locations in same cars after 13 years' service; experience and observation of these cars summarized.

CAST IRON

Graphitization. Graphite in Gray Cast Iron and Its Influence on Strength (Beiträge zur Kenntnis des Graphits im Grauen Gusseisen und seines Einflusses auf die Festigkeit), P. Bardenheuer and K. L. Zeyen. Mitteilungen aus dem Kaiser-Wilhelm-Institut fuer Eisenforschung (Düsseldorf), vol. 10, no. 3, 1928, pp. 23–53, 176 figs. partly on supp. plates. Full report of investigations carried out at Technical Academy of Aachen, previously annotated.

Machinability. Data on Wear and Machinability of Cast Iron, T. H. Wickenden. Am. Metal Market, vol. 35, no. 111, June 12, 1928, pp. 13–17 and 42, 9 figs. Conclusion deduced that hardness alone is not necessarily true index of durability of cast iron; analysis of cylinder blocks, pistons, clutch plates, brake drums, cams, and forming dies, in which nickel and chromium have been used, and improvements secured in performance of these parts; properties improved by nickel and chromium. Reprinted from Feb. 1928, issue of Jl. of Soc. Automotive Engrs.

Nickel. The Future of Alloy Cast Iron. Foundry Trade Jl. (Lond.), vol. 38, no. 617, June 14, 1928, p. 430. It is clear that to produce very best results from alloy addition; conditions under which it should be used must be well understood; basis of development must lie in control of cast iron itself before it leaves melting furnace; general effect of nickel on cast iron.

Oxyacetylene Welding. Strength of Cast Iron Welds, R. H. Hobrock and J. P. Walsted. Welding Engr., vol. 13, no. 6, June 1928, pp. 31–34. Study of some of the effects of thermal treatment on cast iron welded by oxyacetylene process; physical effects of heating welded sections; effects of heating and fusion on chemical composition of welded section and on welding rod; research carried on by Engineering Experiment Station at Purdue University.

Properties. The Static and Fatigue Properties of Some Cast Irons, J. B. Kommers. Am. Soc. Testing Matls.—Preprint, no. 40, for mtg. June 25, 1928, 24 pp., 15 figs. Tests include tension tests on two different sizes of specimens, compression, impact transverse, Rockwell and Brinell hardness, and fatigue tests; several properties of irons are compared, and it is shown that while fatigue endurance limit of cast irons may be roughly estimated from properties such as tensile strength, hardness, and modulus of rupture, knowledge of effect of available factors in influencing properties of cast iron is meager.

CEMENT KILNS

Fuel Economy. Portland Cement Industry, J. Watson. Inst. Fuel—Jl. (Lond), vol. 1, no. 3, Apr. 1928, pp. 309–312. Claims need for totally new form of kiln; progress in fuel economy in manufacture of portland cement is very slight and will be until new process is evolved; at present there is no cheaper or better method of producing cement clinker than by means of rotary kiln.

CHEMICAL ENGINEERING

Fuel Industry. Fuel Industries and Work of Chemical Engineer, A. Duckham. Chem. and Met. Eng., vol. 35, no. 6, June 1928, p. 347. Discusses relation of chemical engineer to fuel-using industries. Abstract of paper read before Soc. of Chem. Industry Conference.

CHROMIUM PLATING

Influence of Cathode. Influence of the Cathode on the Electrodeposition of Chromium, H. S. Lukens. Metal Industry (Lond.), vol. 32, no. 23, June 8, 1928, pp. 567–568. Abstract of paper read before Am. Electrochem. Soc., previously annotated.

Polishing and Buffing. Polishing and Buffing for Chromium Plating, C. H. Eldridge. Metal Industry (N. Y.), vol. 26, no. 6, June 1928, pp. 258–259. Methods used and recommended by General Chromium Corp.

CHROMIUM STEEL

Heat Resisting. Heat-Resisting Steels—Mechanical Properties, W. H. Hatfield. Iron and Coal Trades Rev. (Lond.), vol. 116, no. 3142, May 18, 1928, pp. 739–742. Mechanical strength of steels at high temperature, as affected by introduction of special elements; conditions of test; tensile tests at every 100 deg. cent. up to 1000 deg. on carbon steels; hardened and tempered high-tensile alloy steels; chromium, silicon-chromium and chromium-nickel-tungsten steels; analyses and condition of steels. Abstract of paper read before Iron and Steel Inst.

Refining. Refine Chrome Steel at Low Heat, N. N. Menshih. Iron Age, vol. 121, no. 26, June 28, 1928, pp. 1817–1818. Low temperature essential in basic open-hearth furnace if chromium-bearing scrap is used and if high ballistic tests must be met; deleterious effect of chromium when present from beginning of heat mitigated considerably if certain properties of element and its slag-forming oxides are known and provided for; residual chromium depends upon furnace practice.

COAL

Carbonization. Liquid Fuel From Coal, D. Brownlie. Diesel Engine Users Assn. (Lond.)—Paper, no. 584, read at mtg. Mar. 30, 1928, 40 pp., including discussion. Outstanding national problem in Great Britain; four general methods that may be used for production of liquid fuel from bituminous coal and similar material; high-temperature and low-temperature carbonization; hydrogenation; synthetic liquid fuels.

Research. Studies in Carbonization. Gas Jl. (Lond.), vol. 182, no. 3396, June 20, 1928, pp. 883–888 and (discussion) 888, 5 figs. Tem-

perature, size of coal, blending with coke and inorganic compounds; experimental plant includes horizontal retort closed at one end, condensers, ammonia scrubbers, purifiers, gas meters, and gas sample holders; experimental results; size of coal; temperature of retort; mixtures of coal and coke; mixtures of coal with inorganic compounds; physical structure and reactivity of coke. Abstract of report to Instn. Gas Engrs. See also Gas World (Lond.), vol. 88, no. 2289, June 16, 1928, pp. 633–635.

Liquefaction, Bergius Process. The Conversion of Coal Into Oil by the Bergius Method, J. I. Graham and D. G. Skinner. Inst. Fuel—Jl. (Lond.), vol. 1, no. 3, Apr. 1928, pp. 246–255 and (discussion) 255–261, 3 figs. Full text of paper previously annotated from Instn. Petroleum Technologists—Jl., Feb. 1928.

COAL ANALYSIS

Photographic. A Study of Action of Coal on a Photographic Plate in the Dark, G. S. Haslam. Fuel (Lond.), vol. 7, no. 6, June 1928, pp. 253–257, 10 figs. Action of substance like coal on photographic plate may be due to following factors; radioactivity, direct action of substance or its constituents on photographic emulsion; oxidation of constituent producing compounds capable of affecting plate; moisture contained by substance; to oxidation must be ascribed main cause.

CONVEYORS

Assembly, Lighting. Lighting of Conveyors for Progressive Assembly and Picking Purpose, H. Kuhn. Indus. Mgmt. (Lond.), vol. 15, no. 6, June 1928, pp. 194–195. Important factors to consider are distribution, intensity, surface brightness, angle of incidence, color of light. Translated from V.D.I. Zeit.

Gravity Roller. Gravity Roller Conveyors Cut Handling Costs, E. J. Tournier. Indus. Eng., vol. 86, no. 6, June 1928, pp. 301–303, 5 figs. Classes of materials to be handled; handling molds and castings on gravity-roller conveyors; assembling finished boilers; assembly conveyor for fire-pots; application of gravity roller conveyors for continuous production.

COPPER

Fatigue. A Metallographic Study of the Path of Fatigue Failure in Copper, H. F. Moore and F. C. Howard. Metal Industry (Lond.), vol. 32, no. 24, June 15, 1928, pp. 589–592, 9 figs. Reprint of paper published in Univ. of Ill.—Bul., No. 37, 1928, previously annotated.

COPPER ALLOYS

Review of Progress. Metals and Alloys (Metalle und Legierungen), Masing. V.D.I. Zeit. (Berlin), vol. 72, no. 23, June 9, 1928, p. 787. Brief annual review of progress in production of aluminum and copper alloys; scientific research in alloys.

D

DIESEL ENGINES

Penn State Conference. Diesel Engineers Gather for Penn State Conference. Power, vol. 67, no. 26, 1928, pp. 1162–1163. Review of papers and discussions at Oil Power Conference June 14 to 16 by Oil & Gas Power Division of Am. Soc. of Mech. Engrs.; manufacturing and sales problems studied; mechanical injection used for 11,000-hp. unit; trend toward lightness and higher speeds; demand for standardized Diesel-fuel specifications; standardization of certain engine parts proposed.

Automotive, Research in. The Diesel as a Vehicle Engine, K. Neumann. Nat. Advisory Committee for Aeronautics—Tech. Mem. no. 467, June 1928, 43 pp., 21 figs. Operation of Diesel as vehicle engine investigated for development possibilities; working process of Diesel vehicle engine considered on basis of theoretical indicator diagram; experiments with 4-cylinder four-stroke-cycle Dornier oil engine; Translated from V.D.I. Zeit., May 28, 1927.

Compressorless. The Governing of Compressorless Diesel Engines (Methoden der Regulierung von kompressorlosen Dieselmotoren), O. Holm. Werft—Reederei—Hafen (Berlin), vol. 9, no. 9, May 7, 1928, pp. 173–177, 8 figs. Successful method demands complete efficacy of pump suction stroke; author describes several devices satisfactory from this point of view, and discusses Korting method of fuel-valve governing and Sulzer accumulator valve principle; each system discussed is diagrammatically illustrated. See translated abstract in Mar. Engr. and Motorship Bldr. (Lond.), vol. 51, no. 610, June 1928, p. 231.

Power Plants. Industrial Use of Oil Engines, E. J. Kates. Oil Engine Power, vol. 6, no. 4, Apr. 1928, pp. 241–249, 8 figs. Advantages of modern Diesel power plants; economy at light load, and in small sizes; independence of water supply; quick starting; economy in labor; reliability; maintenance attendance and water costs; interest and depreciation on investment; oil-transportation costs; oil engines not objectionable to neighborhood; advantages to industrialist; power costs in modern oil-engine plants; oil-engine progress.

Supercharging. The Büchi System of Supercharging, A. Stodola. Shipbldr. (Lond.), vol. 35, no. 214, June 1928, pp. 413–416, 4 figs. Results of independent series of tests which were recently carried out by author, of Zurich University, on four-stroke-cycle, six-cylinder engine of design of Swiss Locomotive and Machine Works; rated at 850 b.hp. at normal speed of 167 r.p.m.

Two-Cycle. An Answer to the Question Is the High-Speed Two-Cycle Diesel Possible? P. H. Schweitzer. Power, vol. 67, no. 25, June 19, 1928, pp. 1102–1104, 5 figs. Conclusions reached by O. Holm based on his study of mechanics of scavenging; he found that in 2-stroke-cycle engine neither r.p.m. nor piston speed is determining factor, as it is for 4-stroke-cycle engine; information regarding most favorable port dimensions and charging pressures for various engine speeds.

DILATOMETERS

Application. The Dilatometer and Its Application. Am. Mach., vol. 68, no. 25, June 21, 1928, p. 1019, 3 figs. Operation details of dilatometer by means of which correct quenching temperature is mechanically indicated regardless of type of steel; by arrangement of recording chart to show amount of expansion during heating period, rate of heating is also definitely recorded; by comparison with known rates for steels, proper heating rate for given steel can be controlled.

DIRECTION FINDING

Radio Beacons. Direction Finding at Sea, R. L. Smith-Rose and S. R. Chapman. Times Trade and Eng. Supp. (Lond.), vol. 22, no. 518 June 9, 1928, p. 319. Method of direction-finding at sea has been under examination both by Air Ministry and by Committee on Directional Wireless; which involves erection of rotating beacons at shore stations; results of investigations of such beacon carried out in ships under seagoing conditions. Abstract of Special report, no. 6, Department Sci. and Indus. Research.

DOORS

Manufacture. Manufacturing Hardwood Veneered Doors, G. Beck. Wood-Worker, vol. 47, no. 4, June 1928, pp. 32–33, 4 figs. By specializing for many years on manufacture of one product, concern referred to has obtained high degree of efficiency in plant arrangement and manufacturing methods.

DRILLING MACHINES

Jigs and Fixtures. Pneumatically Controlled Continuous Drilling Machine. Machy. (Lond.), vol. 32, no. 817, June 7, 1928, pp. 289–293, 6 figs. Pneumatically controlled jigs and fixtures used on continuous drilling machine for drilling two holes for feather pins; machine is of rotating type having six heads which carry drill spindles; jigs are primarily air-operated compound cross-slides on which locating pins and drill bushing are mounted.

E

ELECTRIC WELDING, RESISTANCE

Miter. Improving the Miter Weld. Welding Engr., vol. 13, no. 6, June 1928, pp. 39–40, 6 figs. New types of resistance welders are designed to produce miter welds meeting exacting requirements of manufacturing plants.

ENGINEERING RESEARCH

Organization. Organizing the Industry's Engineering Research, A. D. Bailey. Nat. Elec. Light Assn.—Advance Paper for mtg., June 4–8, 1928, 6 pp. Operating companies interested in certain lines of engineering research are encouraging and supporting such work at universities or in private laboratories; research projects typical of work being done by Am. Soc. Mech. Engrs.; Am. Soc. Civ. Engrs., has research committees; Am. Ry. Assn., with its organized research and program for year involving expenditure of two million dollars; recommended that research committee be set up in Engineering National Section.

ETHYL CHLORIDE COMPRESSORS

Rotary. Ethyl Chloride Rotary Compressors, W. W. O'Mahony. Ice and Cold Storage (Lond.), vol. 31, no. 362, May 1928, pp. 123–124, 3 figs. Details of French machine and its use in aviation; direct-coupled driving and special system of automatic lubrication, with complete recovery of oil, are outstanding features; superiority is claimed from standpoint of mechanical efficiency; remarkable applications of this rotary compressor in Bourget Aerodrome Laboratory of medical studies.

F

FEEDWATER

Degasification. The Degasification of Feedwater (Entgasung des Speisewassers), Schlicke. Wärme (Berlin), vol. 51, no. 20, May 19, 1928, pp. 373–374, 1 fig. Description of process for removal of injurious gases at 100 to 120 deg. cent.; its use in industrial power plants.

Treatment. Boiler Scale Prevention, A. T. Ridout. Machy. Market (Lond.), no. 2439, June 1, 1928, pp. 495–496. Physical system of treating water for boilers; by its use seawater may be used for make up feed; system utilizes colloids; coagulation and adsorption of colloids fairly important; treatment of linseed oil; elimination of oil in feedwater. Paper read before Inst. Marine Engrs.

Treatment of Evaporator Feed Water, T. A. Solberg. Power, vol. 67, no. 26, June 26, 1928, pp. 1154–1155. It is felt that there should be no opposition to chemical treatment of evaporator feedwater in view of advantages to be gained, treatment must be reasonably cheap as well as effective; principal advantage is prevention of scale formation; in evaporator it is believed that scale can be prevented with proper control of feedwater condition by using some chemical such as sodium silicate and using constant blowdown (or constant brining) to keep concentration of scale-forming salts below that which will cause scale.

FEEDWATER HEATERS

Control. Automatic Control of Stage Feedwater Heaters, J. M. Drabelle. Power Plant Eng., vol. 32, no. 12, June 15, 1928, pp. 662–663, 4 figs. Method of controlling temperature of feedwater when extraction turbines are added to old plant using open heaters.

FLOW OF FLUIDS

Significance of Static Pressure. See VENTILATION, STATIC PRESSURE.

FLOW OF STEAM

Measurement. Measurement of Steam Flow in Works Practice, H. C. Armstrong and T. Nordenson. Inst. Fuel—Jl. (Lond.), vol. 1, no. 2, Jan. 1928, pp. 161–177 and (discussion) 177–186, 32 figs. partly on supp. plate. Full text of paper previously annotated from Eng. and Boiler House Rev., Dec. 1927.

FLOW OF WATER

Measurement. Applying the Theory of Similitude to Discharge Measurements (Anwendung der Aehnlichkeitstheorie auf Durchflussmessungen), A. Grunwald and F. Engel. V.D.I. Zeit. (Berlin), vol. 72, no. 21, May 26, 1928, pp. 699–702, 9 figs. Review of Reynold's theory of similitude and its application to problems of discharge from orifices, nozzles, Poncelet apertures, etc.; transition from laminary to turbulent flow in case of Venturi meters.

FLUE DUST

Electric Precipitation. Flue Dust Recovery, H. W. C. Henderson. World Power, vol. 9, no. 54, June 1928, pp. 340–347, 7 figs. Application of electric precipitation; describes installations for cleaning blast-furnace gas, coke-oven and producer gas sulphur-dioxide gases in acid industry, and plants working in conjunction with smelting processes, alumina calcining and cement kilns. (Concluded.)

FOUNDRIES

Materials Handling. Handling Plant in the Foundry. Iron and Steel Industry (Lond.), vol. 1, no. 8, May 1928, pp. 253–255, 3 figs. Materials-handling equipment shown at International Foundry Trades Congress and Exhibition in Paris last autumn; diagrams of Bonvillain & Ronceray modern foundry continuous-flow system, continuous-working Rosieres roller molding press, and sand-jet molding machine. Based on account published in V.D.I. Zeit.

Materials Handling Engineers Consider Foundry Work. Foundry, vol. 56, no. 12, June 15,

1928, p. 493. Review of meeting of materials-handling division of Am. Soc. of Mech. Engrs.; system developed for handling small castings speeds up work; unit containers suggested for less than carload lots of freight.

FUEL ECONOMY

Progress. Fuel Economy in 1927 (Zur Bilanz der Wärmewirtschaft im Jahre 1927), D. Przygode. Wärme (Berlin), vol. 51, nos. 20 and 21, May 19 and 26, pp. 368-372 and 384-388, 13 figs. Review of progress in high-pressure steam for peak loads in power plants; interconnection of power and heating plants; long-distance heat installations; refinement of fuel; long-distance gas supply; gas works; coal liquefaction; high-speed compressorless Diesel engines; mercury-vapor steam plants; pulverized coal firing, etc.

FUEL UTILIZATION

Solid and Liquid. Utilization of Solid and Liquid Fuels, C. H. Lander. Engineering (Lond.) vol. 125, no. 3256, June 8, 1928, pp. 722 and (discussion) 701-702. Most important source of fuel is coal; in its passage from solid stage to flue-gas stage, whole range of products from solid carbon to liquid molecules and gaseous molecules are involved; one of most interesting developments of last few months has been application of pulverized coal to marine propulsion. Abstract of paper read before Instn. Civil Engrs. See also Engineer (Lond.), vol. 145, no. 3778, June 8, 1928, p. 628.

G

GAGES

Interferometer (Zeiss). Measuring Gage-blocks by Light Waves, F. Konig. Machy. (N. Y.), vol. 34, no. 11, July 1928, pp. 809-813, 8 figs. Details of new interferometer developed by Carl Zeiss, Jena, Germany, for making absolute measurements; device can also be converted into comparator; measurements to millionths of an inch made; conditions involved in use of polychromic light; swiveling prism for effecting spectral dispersion; adjustable virtual plane of reference about midway between two surfaces of gage block; slide rule used in conjunction with interferometer.

GEARS AND GEARING

Standardization. Tentative American Standard. Machy. (N. Y.), vol. 34, no. 11, July 1928, supp. sheets nos. 133 and 134, 2 figs. Standard spur-gear tooth form, approved by Am. Eng. Standards Committee, Am. Gear Manufacturers' Assn. and Am. Soc. of Mech. Engrs., covering $14^1/_2$-deg. composite system (full-depth tooth) and 20-deg. stub involute system; diagrams of basic racks for both systems.

Thrust. Direction of Rotation and Thrust in Worm and Spiral Gearing. Machy. (Lond.), vol. 32, no. 817, June 7, 1928, supp. sheet no. 66, 8 figs. Diagrams show direction of rotation and thrust for both driver and driven wheels, and cover all cases of these two forms of power transmission.

GRINDING

Surface. Finish Grinding Flat-Surface Work. Am. Mach., vol. 68, no. 24, June 14, 1928, pp. 967-970, 8 figs. Groups of efficient disk or flat surface grinding operations of automatic and semi-automatic type; Gardner grinder equipped with rotary drum that has eight fixtures attached to it; Besly double-ended machine; Badger double-spindle grinder.

GRINDING MACHINES

Surface. Special-purpose Flat Surface Grinding, C. O. Herb. Machy. (N. Y.), vol. 34, no. 11, July 1928, pp. 845-847, 8 figs. High production rates obtained by use of machines designed to handle one part; grinding automobile flywheel housings; rounding 240 curved meter magnets per hour; grinding straight meter magnets; finishing both sides of gear blanks.

H

HAMMERS, DROP FORGING

Design. Drop Forging and Hammer Design, E. C. Clarke. Heat Treating and Forging, vol. 14, no. 6, June 1928, pp. 618-621 and 623. Features in design of steam-drop and board-drop hammers that effect quality and cost of drop forgings; allowable tolerances, power cost and life of equipment are factors; brief analysis of major influences of hammer engineering. Paper presented before American Drop Forge Convention.

HARDNESS TESTING MACHINE

New Type. A New Hardness Testing Machine. Engineer (Lond.), vol. 145, no. 3780, June 22, 1928, pp. 696-697, 3 figs. Details of simple form of machine for carrying out tests on number of articles simultaneously; it is patented invention of E. G. Herbert; principle of operation of "Cloudburst" machine is to "rain down" vast number of small hard steel balls from height adjustable to hardness requirements of particular case upon whole surface under test.

HIGH-SPEED STEEL

Magnetic Analysis. The Incremental Permeability Method for the Magnetic Analysis of High-Speed Steel, W. B. Kouwenhoven and J. D. Tebo. Am. Soc. Testing Matls.—Preprint, no. 31, for mtg. June 25, 1928, 19 pp., 11 figs. Describes new method of magnetic analysis which authors call incremental-permeability method; it uses two magnetomotive forces simultaneously, and change in induction produced by superimposed or incremental magnetomotive force in specimen is measured; this force may be produced by d.c. or a.c. current; magnetic properties of high-speed tungsten-steel bars were investigated and data were obtained which makes it possible to differentiate between heat treatments received by specimens.

HYDRAULIC PRESSES

Steam Platen. Southwark Steel Steam Platen Presses, F. G. Schranz. Baldwin Locomotives, vol. 7, no. 1, July 1928, pp. 68-72, 10 figs. Author deals specifically with steel steam platen press; shows finished plate 31 ft. long by 4 ft. wide by $3^1/_2$ in. thick for use in rubber tile press; type of steam platen press for pressing, drying and finishing composition board which is used as wallboard, insulating board, interior finishing and floor covering; press described is only one of many to suit requirements of various industries.

I

ICE PLANTS

Maintenance and Repair. Operation and Maintenance of Ice Manufacturing Plants, J. A. Hawkins. Ice and Refrig., vol. 74, no. 6, June 1928, pp. 543-544. First considers "Water;" must understand ammonia; condensing pressure; rate of harvesting an individual problem. Paper read before S. Calif. Assn. of Ice Industries.

INDUSTRIAL ORGANIZATION

Function. The Function of an Industrial Organization, A. P. Young. Rugby Eng. Soc.—Proc. (Rugby), vol. 22, 1927-1928, pp. 21-46, 15 figs. Industrial machine; industrial circuit; manufacturing cost of primary importance; factors which control it; supreme position of machine tool in industry; true meaning of mass production; fourteen points of industrial organization.

INDUSTRIAL PLANTS

Maintenance and Repair. Maintenance of Shop Equipment, G. H. Ashman. Indus. Mgmt. (Lond.), vol. 15, no. 6, June 1928, pp. 206-208. Organization of maintenance department with discussion of various functions and responsibilities such as care of buildings, continuous inspection, building foundations, repairs, power, heat and light upkeep, storage of dies, patterns and jigs, safety devices. Abstract of paper presented before The American Society of Mechanical Engineers.

INTERNAL-COMBUSTION ENGINES

High-Speed. The Internal Combustion Engine, H. R. Ricardo and G. Porter. Modern Transport (Lond.), vol. 19, no. 482, June 9, 1928, pp. 15 and 17. Brief review of papers dealing with light high-speed and heavy types presented before Instn. Civil Engrs.

Light High-Speed Internal-Combustion Engines, H. R. Ricardo. Engineering (Lond.), vol. 125, no. 3257, June 15, 1928, pp. 751-752 and (discussion) 727. Speed of engines is limited by (1) breathing capacity, (2) dissipation of heat from connecting-rod big-end bearings, and (3) mechanical operation of valves. Abstract of paper read before Institution of Civil Engineers.

Oil Corrosion. Oil and Corrosion, H. J. Young. Mar. Engr. and Motorship Bldr. (Lond.) vol. 51, no. 610, June 1928, pp. 206-207. Direct oil-corrosion test defended by its originator; author's method of detection was not to analyze oil but to run it over steel and white metal; attitude of oil companies toward paper entitled "Corrosion by Oil;" problems related to corrosion by oil which require close attention.

Pistons, Aluminum Alloy. Light Piston Alloys, H. Reimger. Automotive Abstracts, vol. 6, no. 6, June 20, 1928, p. 178. Attempts have been made to manufacture pistons from organic compounds probably similar to bakelite, etc., but have led to no results; aluminum and magnesium are still only basic materials; discusses different metals used for alloying with aluminum. Brief abstract translated from Motorwagen, Apr. 10, 1928, p. 217.

IRON ALLOYS

Nickel. The Influence of Nickel and Silicon on an Iron-Carbon Alloy, A. B. Everest, T. H. Turner and D. Hanson. Iron and Steel Industry (Lond.), vol. 1, no. 6, Mar. 1928, p. 194. Account of preliminary work on effect of nickel on simple iron-carbon-silicon alloys, over ranges of nickel between 0 and 40 per cent, and of silicon between 0 and 3.6 per cent. Abstract of paper read before Iron and Steel Inst.

IRON AND STEEL

Corrosion. Corrosion of Iron and Steel, W. B. Lewis and G. S. Irving. Iron and Steel Industry (Lond.), vol. 1, no. 6, Mar. 1928, pp. 185-186. Corrosion of iron and steel in general and more particularly corrosion in marine boilers; acid theory; older electro-chemical theory; colloidal theory; differential-aeration corrosion in steam boilers; two main types of corrosion; water-level corrosion; importance of keeping boilers free from scale. Condensed from paper read before Inst. Mar. Engrs.

IRON AND STEEL PLANTS

Oxyacetylene Welding Repairs. Oxwelding Heavy Mill Engines. Iron Age, vol. 121, no. 25, June 21, 1928, p. 1751, 5 figs. Five halftones illustrating oxyacetylene welding and cutting repairs in steel mills, each accompanied by brief description.

Turbo-Blowers. Performance Data Should Include All Facts. Power Plant Eng., vol. 32, no. 12, June 15, 1928, pp. 668-669. In order to analyze properly performance of turbo-blower with its governing mechanism not only records of air pressure and air volume, but also records of steam pressure, steam temperature, vacuum, atmospheric temperature and atmospheric pressure should be available; faulty action of instruments affects readings.

IRON AND STEEL INDUSTRY

Changes in. Iron Industry Facing Great Changes, E. C. Eckel. Iron Age, vol. 121, no. 24, June 14, 1928, pp. 1669-1671, 1 fig. First period of sharply arrested growth in 150 years puts premium on operating economies and marked departures in processes; ore reserves under no strain; production likely to become more decentralized; Franco-Belgian industry looms as serious competitor; pressure on Lake Superior ores likely to be checked; Wabana and Mayari ores are possible sources of alumina cement; projected and actual trends of world output; world market has stopped growing.

IRON CASTING

Gray. Ways to Improve Gray Iron Castings, R. Moldenke. Iron Age, vol. 121, no. 25, June 21, 1928, pp. 1747-1749. High strength of superheat or high-test irons points to recapture of lost markets; high malleability attainable also; superheating destroys graphite nuclei; hold superheated metal before pouring; composition of high-test irons; results of alloy additions; advances summarized.

J

JAPANNING OVENS

Explosion Prevention. Oven Fires and Explosions, A. E. Maehler. Brass World, vol. 24, no. 16, June 1928, pp. 177-178, 2 figs. Steps taken to eliminate definitely cause of japan-oven fires and explosions.

JIGS

Design. Boring, Facing and Tapping Fixture, B. J. Stern. Machy. (N. Y.), vol. 34, no. 11, July 1928, pp. 835-836, 1 fig. Fixture for use in finishing face and tapping pipe thread in hole of cast-iron pipe flange.

L

LOCOMOTIVE BOILERS

Nickel Steel. Nickel Steel for Locomotive Boilers, C. McKnight. Boiler Maker, vol. 28, no. 6, June 1928, pp. 152–157, 7 figs. Possesses high strength and ductility; Canadian Pacific Railway locomotives; comparison of nickel and carbon steel plates; high-temperature characteristics of nickel steel; embrittlement in service; uniformity of nickel steel; corrosion and firebox cracks; boiler tubes and staybolts.

LOCOMOTIVES

Internal Combustion. New-Type Shunting Locomotive. Modern Transport (Lond.), vol. 19, no. 482, June 9, 1928, pp. 16–17, 3 figs. Description of switching locomotive designed for use on plantations where coal is not available; will operate on gasoline, paraffin or wood alcohol; engine capable of developing 102 hp. at 1000 r.p.m.; drawbar pull of four tons; haulage capacity on level of 400 tons; cylinders are $5^3/_4$-in. bore by $6^1/_2$-in. stroke; started by $3^1/_2$-hp. motorcycle engine.

Feedwater Heaters. Effect of the Feed-Water Heater on Overall Engine Efficiency Railroad Herald, vol. 32, no. 7, June 1928, pp. 31–32, 2 figs. Effect of feedwater heater on boiler; effect of heater on overall engine performance.

Frames. A Novel Method of Frame Construction, L. L. Neebe. Baldwin Locomotives, vol. 7, no. 1, July 1928, p. 55, 2 figs. New method of locomotive frame construction, that eliminates splices between upper and lower front rails and main frames; shows old design of frame with bolted joints, and new design; both front rails are cast integral with main frame; after bolting to cylinder, rail is welded to main frame.

High-Pressure. The Schmidt-Henschel High Pressure Locomotive. Int. Ry. Congress Assn.—Bul. (Brussels), vol. 10, no. 5, May 1928, pp. 418–429, 4 figs. Description of test locomotive built and tested by German State Railways; tabulated results of road tests; trials were carried out by German Federal Railways, with aid of dynamometer car. Abstracted from Engineer (Lond.).

The Winterthur Locomotive for High-Pressure Steam (60 Atmospheres) [La locomotive Winterthur à haute pression de vapeur (60 atm.)]. Technique Moderne (Paris), vol. 20, no. 11, June 1, 1928, pp. 400–401, 2 figs. Describes and shows general arrangement of high pressure Winterthur locomotive; 3 cyls. of 215 mm. diameter, 350 mm. stroke.

Oil Burning, Fireboxes. T. & P. Tests Special Firebox for Oil-Burning Locomotives. Ry. Age, vol. 84, no. 23, June 8, 1928, pp. 1324–1326, 4 figs. Comparative test runs with locomotive equipped with standard firebox shows nine per cent fuel saving; results of tests comparing Martin water-tables with firebox of conventional construction; installation provides additional features; table and firebox construction; circulation of water.

Pulverized Coal. The A. E. G. Pulverized Fuel Locomotive. Colliery Guardian (Lond.), vol. 136, no. 3519, June 8, 1928, pp. 2247–2248, 2 figs. Illustrations and some descriptive matter, furnished by A.E.G. (German General Electric Co.) Machinery and Apparatus Co.; conversion cost of G8-2type locomotive is about 1780 pounds sterling.

Steam Turbine. Report on Steam Turbine Locomotives. Ry. Mech. Engr., vol. 102, no. 6, June 1928, pp. 331–335, 5 figs. Proposed turbine-locomotive design; transmission; steam boiler; pulverized-coal burners; turbine and generator; condensers; feedwater heater, pump and injector. Abstract of report presented to Int. Ry. Fuel Assn.

Valve Gears (Caprotti). A Locomotive with Poppet Valves, A. Caprotti. Baldwin Locomotives, vol. 6, no. 3, Jan. 1928, pp. 67–68, 2 figs. Points out principal details of its construction; largest engines require no power reverse and cab lever is entirely free from all kicking.

LOOMS

Bearings. Comparative Performance of Looms with Plain and Roller Bearings, G. H. Perkins. Am. Soc. Mech. Engrs.—Textile Div. Paper, for mtg. May 22, 1928, 5 pp., 2 figs. Full text of paper, previously annotated from Textile World, May 26, 1928.

LUBRICATING OILS

Properties. The Viscosity-Gravity Constant of Petroleum Lubricating Oils, J. B. Hill and H. B. Coats. Indus. and Eng. Chem., vol. 20, no. 6, June 1928, pp. 641–644, 5 figs. Viscosity-gravity constant is low for paraffinic crudes and high for naphthenic crudes; its value for any oil is direct index of degree of paraffinic or naphthenic character which it possesses.

M

MACHINE TOOLS

Clutches. An Overrun Silent Pawl-Clutch, A. Fredericks. Am. Mach., vol. 68, no. 23, June 7, 1928, pp. 913–914, 6 figs. Details of pawl clutch which is both efficient and positive in operation; primarily used as two-speed drive, returning the table of special milling machine at accelerated speed at end of cutting stroke; drive action applied at two points diametrically opposite each other; method of checking and setting pawls and shoes.

For Centrifugal Pumps. Machining Covers for Centrifugal Pumps, J. E. Fenno. Machy. (N. Y.), vol. 34, no. 11, July 1928, pp. 816–818, 4 figs. Tools designed for machining cast-iron volute covers; special tool holder and cam constructed to guide tool according to eccentricity and depth of groove; drill jigs.

Improvements. Machine Tools and Tools (Werkzeugmaschinen und Werkzeuge), Buxbaum. V.D.I. Zeit. (Berlin), vol. 72, no. 23, June 9, 1928, p. 790. Annual review of progress in design and construction of drilling, milling, grinding, shearing, punching, planing machines and tools, lathes, etc.

Obsolescence. Data on Machine Tool Obsolescence to Be Sought in Survey, K. W. Stillman. Automotive Industries, vol. 58, no. 24, June 16, 1928, pp. 903–904, 1 fig. Machine-tool obsolescence considered of vital importance in enabling factories to take proper account of operating costs; ordinary depreciation write-off does not meet situation; individual investigations; difficult problem is development of method for using data for future protection and is one in accounting.

Standardization. Reports of Divisions to Standards Committee—Production Division. Soc. Automotive Engrs.—Jl., vol. 22, no. 6, June 1928, pp. 719–725, 7 figs. Report submitted for approval after having been considered carefully by Division; tool-holder shanks and tool-post openings; terminology; taps, cut and ground threads; cylindrical plug and thread gages; ring thread-gages; line drawings and tables of dimensions given.

Steel Castings. Substitution of Steel Castings for Cast Iron in Machine Tool Construction, H. J. Hart. Am. Mach., vol. 68, no. 15, Apr. 12, 1928, p. 626. Electric Steel castings run from 70,000 to 240,000 lb. per sq. in. in tensile strength, with toughness of elongation many times that of cast iron, generally showing ductility of 20 to 40 times that of cast iron; with steel castings it is quite possible to obtain annealed casting that can readily be worked and machined cheaply. See discussion by J. B. Armitage, E. Stubbs and B. P. Graves in June 28 issue of same Journal.

MANGANESE STEEL

Machining. Progress in Machining Manganese Steel, A. S. Martin. Machy. (N. Y.), vol. 34, no. 11, July 1928, pp. 862–863, 3 figs. Examples of what is now being accomplished in way of machining cast and rolled manganese steel; proper tool angles, feeds, and speeds determined by experiments; shape of drill points for manganese steel; cutting keyways; shaping, planing and boring operations. (Continuation of serial.)

MATERIALS HANDLING

Cost Reduction. Effective Materials Handling Reduces Production Costs, H. V. Coes. Wire, vol. 3, no. 6, June 1928, pp. 201 and 204–205. Chicago wire manufacturer analyzes fundamental principles of materials handling for A.S.M.E.; sets down known facts, such as will guide to correct solution of materials handling problem, and right use of materials-handling devices; quotes rules. Paper presented before Am. Soc. Mech. Engrs.

METAL WORKING INDUSTRY

Research. Research in Metal Working Industries. Am. Mach., vol. 68, no. 26, June 28, 1928, pp. 1041–1042. Summary of research policies of 187 "millionaire" manufacturing companies in metal-working industries; average expenditure for research is $68,300 per year; benefits of at least one-third of industrial research passed on to consumer in form of improved products; development of new fields for standard products is of major interest to 25 per cent of metal-working companies; profits of research.

MILLING MACHINES

Large. Giant Combination Milling, Boring and Drilling Machine. S. Weil. Machy. (N. Y.) vol. 34, no. 11, July 1928, pp. 814–815, 2 figs. Gigantic machine built by Schiess-Defries A.G., Dusseldorf, Germany, is specially intended for use in machining heavy parts completely at one setting; two parallel three-way beds, each 92 by 8 ft.; column mounted on cross-bed; six motors are employed for machine.

MOTOR CARS (RAILROAD)

Gasoline-Electric. Gas-Electric Motor Cars as Applied to Steam Railroads, P. M. Gillilan. Ry. Age, vol. 84, no. 22, June 2, 1928, pp. 1273–1275, 1 fig. Presentation of desirable features of differential field-generator control; gas-electric cars are operated usually in 2-car trains; table shows average comparison of 85-ton, 2-unit, 275-hp. gas-electric train compared with steam train which it replaced; differential field control; relation of engine and generator characteristics air supply.

A Mack-Westinghouse Rail Car on the New York Central, K. R. Stearns. Railroad Herald, vol. 32, no. 7, June 1928, pp. 24–25, 1 fig. Double-unit gas-electric rail car; outstanding points are small, quickly replaceable engine-generator sets; Venturi-ejector system for supplying draft of air through radiators by energy of engine exhaust gases and arrangement of control to load engines to full torque over wide range of car and engine speeds.

N

NATURAL GASOLINE INDUSTRY

Progress in. Progress of the Natural-Gasoline Industry for 1926–1927, H. B. Bernard. Petroleum (A.S.M.E. Trans.), vol. 50, no. 12, Jan.-Apr. 1928, pp. 3–5, 5 figs. In Seminole Field, air or gas lift used for producing oil and for producing oil and extracting gasoline with same equipment; use of superheated steam for power and process requirements; gas injection on two-cycle engines.

NITROGEN INDUSTRY

International Conference. The Nitrogen Conference on Adriatic. Chem. and Industry (Lond.), vol. 47, no. 22, June 1, 1928, pp. 575–577. Second International Nitrogen Conference took place from Apr. 30, to May 8, on board S. S. Lutzow; review of papers read covering subject of nitrogen economies and problems, nitrogen fertilizers, etc.

O

OIL ENGINES

Heavy. Heavy Internal-Combustion Engines, G. Porter. Engineering (Lond.), vol. 125, no. 3257, June 15, 1928, pp. 752 and (discussion) 727. To improve running conditions and to attain higher powers, hybrid type has been designed; constant-pressure cycle has been abandoned in favor of more economical dual cycle; on ground of simplicity, it is probable that airless-injection system will be more generally employed in future; remarkable characteristics of heavy-oil engine adapt it admirably to service of centralized system for supply of electric energy. Abstract of paper read before Instn. Civil Engrs.

Standby Service. Oil Engines Serve Well for Standby Loads. Power Plant Eng., vol. 32, no. 12, June 15, 1928, pp. 670–672, 3 figs. Low standby loss, high efficiency of operation and rapid starting ability make oil engine well suited as auxiliary in large stations.

OIL FUEL

Synthetic. Liquid Fuels Other Than Petroleum, A. E. Dunstan and H. G. Shatwell. Inst. Fuel—Jl. (Lond.), vol. 1, no. 3, Apr. 1928, pp. 262–268 and (discussion) 268–271. Full text of paper previously annotated from Instn. Petroleum Technologists—Jl., Feb. 1928.

OIL TANKS

Design. Design of Pressure Vessels for Oil, T. Mc. Jasper. Oil and Gas Jl., vol. 27, no. 4, June 14, 1928, pp. 128–129, 6 figs. Strength of steel; resistance of corrosion; resistant lining; conditions for testing; effect of temperature; effect of shape of heads and lack of reinforcement; vessel design; test results; correct shape of head; ductile leak proof joint. Paper presented before Western Petroleum Refiners Assn.

OIL WELLS

Drilling. Oil Well Drilling and Production Methods, L. Steiner. Eng. Progress (Berlin), vol. 9, no. 6, June 1928, pp. 161–166, 11 figs. Author deals with European production methods; use of compressed air or gas has not gained any prominence in European practice, except in certain number of Russian oil fields; bailers and plungers; deep-well pumps; submersible pumping units; well-sounding gear. (Concluded.)

Drilling Equipment. Progress in Rig and Field Equipment, G. McConnell. Petroleum (A.S.M.E. Trans.), vol. 50, no. 12, Jan.-Apr. 1928, p. 2. Wells drilled to depths of 4000 and 5000 ft. accomplished by use of more powerful machinery, higher quality of tubular goods, and better selection of wire rope and transmission equipment; influence of Am. Petroleum Inst. program for purpose of standardizing equipment is increasing in importance; haste is too much governing factor; production at any cost rules instinct of successful operator.

Pumping. Hydraulic Long Stroke Pumping of Deep Wells. Oil Field Eng., vol. 3, no. 6, June 1, 1928, p. 52, 1 fig. Carter Oil Company's Waite well at Oxford, Kansas, 4300 ft., and same company's Lukes well, 3400 ft., in Seminole oil field; apparatus is cylinder and ram device actuated by hydraulic pump; known as Mason Long Stroke Pump and invented by R. C. Mason; detailed description of equipment; eight 12-ft. strokes per minute pump 600 barrels per day through 2$^1/_2$ in. tubing; when pumped through casing larger production was obtained.

See also PETROLEUM.

P

PAINT SPRAYING

Hazards. Spraying Troubles. Labor and Industry, vol. 15, no. 5, May 1928, pp. 3–10, 2 figs. Discussion of some factors in spray finishing which involve danger of explosion and fire, and means of preventing accidents.

PETROLEUM

Production Methods. Progress in the Production of Oil, H. R. Pierce. Petroleum (A.S.M.E. Trans.), vol. 50, no. 12, Jan-Apr. 1928, pp. 1–2. Since producing formations have been getting deeper, methods have had to change during past year; greater stored energy; oil enters drill hole at rapid rate; removal from well becomes problem; long-stroke high-speed pumps developed and new kinds of swabs and bailing methods tried; air-lift method best for large quantities of oil; pool production or control necessary; corrosion.

Refining. Progress in Refining, W. Samans. Petroleum (A.S.M.E. Trans.), vol. 50, no. 12, Jan.-Apr. 1928, pp. 6–9. Governing factor in progress is supply and demand; savings possible in manufacture; construction and engineering problems; various processes in vogue; developments in manufacture and use of steam and power; research work under way.

Transportation. Development of Transportation of Crude Oil in 1927, B. P. Sibole. Petroleum (A.S.M.E. Trans.), vol. 50, no. 12, Jan.-Apr. 1928, pp. 5–6. Conservation has been keynote in transportation of crude oil, especially by pipe line; gathered from wells by pipe lines; while small portion is carried to delivery or tide-water by tank cars, most of it goes on to such delivery by pipe line; conservation of oil; conservation of equipment; economy in movement.

PLASTICS

New Molded Products. Casein plus Furfural equals New Molded Product. Plastics, vol. 4, no. 2, Feb. 1928, pp. 80 and 93. Combination of waste from two food product industries yields new and useful plastic material resembling resinoids in its general properties; heat and pressure cause reaction between casein and furfural, somewhat analogous to that occurring when formaldehyde acts on proteid.

PLATE MILLS

Electric Drive. The New 84-in. Tandem Plate Mill of the Lukens Steel Company, J. H. McElhinney and W. H. Burr. Gen. Elec. Rev., vol. 31, no. 6, June 1928, pp. 297–302, 14 figs. General description of plant and products; electric equipment; roughing and finishing mills; heat-treating and charging operations; finishing processes in plate production.

PORT TERMINALS

Operation. Marine Terminal Operation, W. C. Brinton. Pac. Mar. Rev., vol. 25, no. 6, June 1928, pp. 250–251. Suggestions for reduction of costs at that point in steamship operation where waste is most apparent and economy is least stressed; relatively few men in terminal operations of shipping companies with mechanical training, not to mention engineering education; few trenchant remarks on sorting evil; packages. Excerpts from paper presented before Matls. Handling Division of Am. Soc. Mech. Engrs.

POWER PLANTS

Ash Handling. Water Sluice Ash Conveying. Eng. and Boiler House Rev. (Lond.), vol. 41, no. 12, June 1928, p. 604, 2 figs. Details of "Usco" (Underfeed Stoker Co.) installations; general principle is applied according to three methods: (1) continuous sluice; (2) submerged drag-link conveyor; (3) intermittent sluice.

Heat Balance. A Method for Calculating Central Station Heat Balance, E. B. Hyde, Jr. and M. A. Guigou. Power, vol. 68, no. 1, July 3, 1928, pp. 12–17, 16 figs. Article presents simplified method of calculating heat balance for proposed power station, indicates data required, and tells how to obtain it; finding amount of steam taken by turbines; heat-balance calculations.

POWER PLANTS, HYDROELECTRIC

Equipment. Hydraulic Power Plants and Machinery (Wasserkraftmaschinen und-Anlagen), Oesterlen. V.D.I. Zeit. (Berlin), vol. 72, no. 23, June 9, 1928, pp. 776–777, 1 fig. Annual review of progress in design and construction of propeller and Kaplan turbines, Francis urbines, waterwheels; pumped storage plants.

Maryland. Construction Problems, W. L. Locke. Stone and Webster Jl., vol. 42, no. 6, June 1928, pp. 827–838, 5 figs. General scheme of constructing Conowingo developments; master progress chart was prepared; transportation is keynote to all operations such as Conowingo; water diversion was major problem; traveling derrick which erected structural steel in power station.

POWER PLANTS, STEAM

Design. Prospective Development in the Generation of Electricity and Its Influence on the Design of Station-Plant, S. L. Pearce. Engineering (Lond.), vol. 125, no. 3257, June 15, 1928, pp. 753–754 and (discussion) 728–729, 2 figs. Important factors which influence design of stations and plants; employment of larger individual units for both steam-generating and steam-raising purposes; employment of higher steam pressures and temperatures with or without reheating and with regenerative feed heating; adoption of higher voltages. Abstract of paper read before Instn. Civil Engrs.

The Trend of Power Plant Design, F. H. Daniels. Blast Furnace and Steel Plant, vol. 16, no. 6, June 1928, pp. 790–793, 5 figs. Increased boiler pressures and higher degrees of superheat in modern installations have brought about improvements in design of boiler settings and in methods of burning fuel; types of stokers for various fuels; controlling air for combustion; progress in burning of pulverized coal.

High Pressure. Operating Experiences with 1300-Pound Steam Pressure, J. Anderson. Inst. Fuel—Jl. (Lond.), vol. 1, no. 2, Jan. 1928, pp. 131–149 and (discussion) 149–160, 18 figs. Full text of paper previously annotated from Engineering, Jan. 6 and 13, 1928.

POWER PLANTS, STEAM-ELECTRIC

Equipment Purchasing. Competitive Purchasing and Evaluation of Proposals for Power-Plant Equipment, L. B. Bonnett. Mech. Eng., vol. 50, no. 7, July, 1928, pp. 521–522. Describes procedure employed by Brooklyn Edison Co., which it is believed encourages manufacturers to propose best equipment they know how to build; it is believed to result in fairest judgment of merits of different proposals and therefore in purchase of most satisfactory equipment for physical conditions which have to be met.

PRODUCTION METHODS

Non-Repetition Work. The Application of Manufacturing Methods to Non-repetition Work, H. C. Armitage. Mech. World (Manchester), vol. 83, nos. 2161 and 2162, June 1 and 8, 1928, pp. 402–403 and 419–420. June 1: Characteristics of English manufacturing and their possible application in non-repetition works; comparison of manufacturing with general engineering; value of grouping plant unit-machining and sub-assembly sections. June 8: Manufacturing operations; piecework is fine organizer; economies resulting from planning system. Paper presented to Instn. Production Engrs.

PRINTING PRESSES

Manufacture. What Modern Equipment Has Done, K. H. Condit. Am. Mach., vol. 68, no. 25, June 21, 1928, pp. 991–992, 2 figs. Example of how manufacturing costs can be reduced by modernizing production equipment in small-lot shop; production methods in plant of Miehle Printing Press & Mfg. Co. and time-saving equipment used.

PRODUCTION CONTROL

Western Electric Co. Production Control, S. S. Holmes. Mgmt. Rev., vol. 17, no. 7, July 1928, pp. 219–228, 1 fig. Description of generally accepted principles of production control as they are applied in manufacturing department of Western Electric Co.; plant employs approximately 5000 people, occupies 1,300,000 sq. ft. floor space, produces annually $27,000,000 worth of product; design analysis and preparation of drawings; manufacturing schedule; production program; maintaining stock of materials and parts; tracing work in process; development of equipment and methods. Paper presented before joint meeting of Am. Mgmt. Assn. and Soc. Indus. Engrs.

PULVERIZED COAL

Developments. Pulverised-Fuel Developments in the United States, L. M. Jockel. Elec. Rev. (Lond.), vol. 102, no. 2637, June 8, 1928, pp. 1013–1014. Notes from serial report of Prime Movers Committee of N.E.L.A.; facts relating to successes and to failures; details as to furnace walls, preheaters, burners, etc., are stated in tables; valuable information relating to operation and maintenance of various plants; report contains useful proximate analyses of various coals used, which are generally high grade bituminous varieties.

PUMPING STATIONS

Milwaukee, Wis. New Pumping Equipment for Milwaukee Water-Works, H. H. Brown. Eng. News-Rec., vol. 100, no. 22, May 31, 1928, pp. 843–845, 3 figs. Deals with three new 400-hp. 2-pass boilers and new 40-m.g.d. steam-turbine-driven centrifugal pump; shows progress that is being made in Milwaukee water-works.

R

RAILROADS

Repair Shops, Heat Treating. Heat Treating Methods and Equipment for Railroad Shops. Ry. and Locomotive Eng., vol. 41, no. 4, Apr. 1928, pp. 113–114. Suggestions on preheating; manufacture and repairs to high-speed machine tools; chisels, calking and similar tools; and reamers, taps, rivet sets, etc. Committee report to Am. Ry. Tool Foremen's Assn.

RAILS, STEEL

Research. Fatigue Resistance of Rail Steel, J. R. Freeman, Jr. Iron Age, vol. 121, no. 25, June 21, 1928, pp. 1743–1745, 3 figs. Discussion of test data secured from Bureau of Standards investigations of comparative properties of rails made from rising steel in standard big-end-down ingot molds and rails from fully piping (killed), steel made in big-end-up sinkhead ingot; endurance ranges from 46,000 to 59,000 lb. per sq. in.; rail steel killed with aluminum can be poured free from pipe and excessive segregation in sink-head molds of Gathmann type.

REFRACTORY MATERIALS

Problems. The Problem of the Refractory. Eng. and Boiler House Rev. (Lond.), vol. 41, no. 12, June 1928, pp. 590 and 593. Author attempts to state point of view of progressive manufacturer of refractories; conditions which tend to destroy refractories in actual service fall mainly under two headings; erosion by fuel slag, clinker, dust-carrying gases or other fluxes and problem of spalling and cracking in service.

REFRIGERATING PLANTS

Corrosion. Corrosion in Refrigerating Plants. Refrig. World, vol. 63, no. 6, June 1928, p. 23. For calcium-chloride brine; open brine systems; condenser systems. Technical staff of Mass. Inst. Tech. submitted recommendations to Am. Soc. Refrig. Engrs.

REFRIGERATION

Progress. Refrigerating Engineering (Kältetechnik), R. Plank. V.D.I. Zeit. (Berlin), vol. 72, no. 23, June 9, 1928, pp. 780–781. Brief annual review of progress in design and construction of refrigerating plants; applications of refrigeration.

RIVERS

St. Lawrence. The St. Lawrence Waterway, W. Kelly, E. A. Forward and J. P. Hogan. Mech. Eng., vol. 50, no. 7, July 1928, pp. 509–

512, 3 figs. Symposium dealing with waterway itself and with its power and navigation potentialities; first paper gives particulars of waterway and its five sections of improvements recommended by Joint Board of Engineers of United States and Canada and of ice conditions which will have to be overcome; second paper deals with transportation problems, character of traffic, improvements necessary; in third paper estimates are made of cost of generating power at most favorable site, and questions involved in problem of marketing power are discussed.

ROLLING MILLS

Continuous. Continuous Process Methods Multiply Maintenance Responsibilities, J. H. Van Deventer. Indus. Eng., vol. 86, no. 6, June 1928, pp. 270–272. Ashland, Ky., plant of American Rolling Mill Co. mile and half of unbroken continuous operation, beginning with blast furnaces and ending in final finishing rooms and warehouses; continuous-mill operations in iron and steel business today take two forms.

Electric Drive. Electric Drive for the Bethlehem Wide-Flange Structural Mill at Lackawanna, F. D. Egan. Gen. Elec. Rev., vol. 31, no. 6, June 1928, pp. 289–296, 18 figs. Blooming, roughing, and finishing mills; five driving motors; 3500 to 17,150 hp. three flywheel motor-generator sets; power supply control of operation.

RUBBER

Research. Effects of Temperature and Humidity During the Preparation and Testing of Rubber Compounds. Franklin Inst.—Jl., vol. 206, no. 5, May 1928, pp. 719–720. Abstract of report by physical testing committee of rubber division of American Chemical Society; report presents complete data and final conclusions based on investigation conducted at Bureau of Standards in accordance with program drawn up by physical testing committee.

S

SHIP PROPULSION

Superheated Steam. The Generation and Utilization of High-Pressure Superheated Steam for Marine Propulsion, Weir and H. E. Yarrow. Engineering (Lond.), vol. 125, no. 3256, June 8, 1928, pp. 721 and (discussion) 701. From thermodynamic aspect, there is no maximum limit to temperature which might be used, but there is practical limit fixed by nature of materials available; corrosive and erosive effects of working fluid are intensified by high temperature, but definite limitations are imposed in main by weakening influence of temperature on constructional materials in use. Abstract of paper read before Instn. Civil Engrs. See also Engineer (Lond.), vol. 145, no. 3778, June 8, 1928, p. 627.

STEAM ACCUMULATORS (RUTHS)

Hamburg, Germany. An Electric Railway Stores Steam, W. Mattersdorff. Power, vol. 68, no. 1, July 3, 1928, pp. 8–9, 4 figs. Modern steam accumulator displaces storage batteries and banked boilers at Hamburg Elevated Railway Plant; boiler equipment; two Ruths accumulators installed; method of governing turbine is illustrated; instances illustrate how functioning of accumulator offsets service troubles.

STEAM CONDENSERS

Scale Prevention. Scale Prevention in Surface Condensers (Kühlwasser-im pfung), Eschmann. Wärme (Berlin), vol. 51, no. 14, Apr. 7, 1928, pp. 269–272, 7 figs. Mechanical devices for cleaning condenser tubes are liable to injure metal; so-called "inoculation process" consists in introducing small percentage of certain acid into make-up water of circulating system; acid converts part of carbonates in water into chlorides, liberating sufficient carbon dioxide to keep remainder of carbonates in solution; as consequence, no deposits of scale are formed in tubes, and heat transfer is continually at its maximum value.

STEAM ENGINES

Bleeding. New Design for Bleeding Steam Reduces Industrial Power Costs. Power, vol. 67, no. 22, May 29, 1928, pp. 972–975, 5 figs. Bleeder-type engines in general comprise control mechanism to furnish automatically desired amount of heating steam as function of its pressure; problem of incorporating bleeding mechanism in uniflow engines.

STEAM, HIGH PRESSURE

Utilization. Use of High Pressures and Superheat (Emploi des hautes pressions et surchauffes), Duberstret. Société des Ingénieurs Civils de France (Paris)—Memoirs, vol. 81, nos. 1 and 2, Jan. and Feb. 1928, pp. 219–265, 39 figs. partly on supp. plates. Review of principal theories and applications; superheating; projects and plants and description of turbines; conclusions.

STEAM PIPE

High Pressure, Fittings. Valves and Fittings for High Pressure Steam Piping, F. H. Morehead. South. Power Jl., vol. 46, no. 6, June 1928, pp. 65–72, 19 figs. New requirements in design, materials and workmanship of valves; features of line of modern high-pressure high temperature gate valves designed and manufactured to meet needs of these new service conditions; determination of coefficients of expansion of plain carbon cast steel and number of different compositions of stainless steel, some containing chromium only and others containing both chromium and nickel.

STEAM PIPE LINES

Joints. Pipe Joints That Will Hold at High Pressures and Temperatures, I. W. Whittle. Power, vol. 67, no. 24, June 12, 1928, pp. 1051–1052, 3 figs. Weld-sealed pipe joints for high steam pressures and temperatures insure both tightness and strength; these joints may take many forms, each having its advantages.

STEAM TURBINES

Multiple-Cylinder. Multi-Cylinder Steam Turbines, J. P. Chittenden. Rugby Eng. Soc.—Proc. (Rugby), vol. 22, 1927–1928, pp. 75–104 14 figs. Description of various types of multi-cylinder turbines; impulse reaction type; reaction type; example of pure reaction multi-cylinder turbine; two impulse-type turbines discussed in detail; influence of details of design on turbine efficiency; features of many impulse turbines in multi-cylinder designs.

Practice. The General Trend of Modern Development in Steam-Turbine Practice, H. L. Guy. Engineering (Lond.), vol. 125, no. 3257, June 15, 1928, pp. 752–753 and (discussion) 727–728. Of tendencies affecting thermal efficiency of steam plant perhaps most evident is pronounced movement toward higher steam pressures; regenerative feed heating; introduction of feed heaters, evaporators, and ejectors. Abstract of paper read before Instn. Civil Engrs.

STEEL MANUFACTURE

Crucible Process. The Use of High-Class Swedish Iron in the Manufacture of Crucible Steel. Iron and Steel Industry (Lond.), vol. 1, no. 8, May 1928, p. 249. Ever since crucible process was started in Sheffield, Swedish bar iron has constituted main raw material; two main methods used in crucible process; charging crucibles; nature of slag.

STOKERS

Locomotive. Mechanical Stokers for Locomotives, W. G. Clark. Baldwin Locomotives, vol. 6, no. 3, Jan. 1928, pp. 29–41, 25 figs. First stokers; several of underfeed type; limit in stoker firing of large locomotives is about reached, and present trend is backward toward firing of smaller locomotives with mechanical stokers; present stokers grouped into two general classes, steam jet type, and shovel type.

Underfeed. Burning Coal on Underfeed Stokers, J. G. Worker. Blast Furnace and Steel Plant, vol. 16, no. 6, June 1928, pp. 784–786, 2 figs. Chemical and mechanical features involved in combustion as attained in underfeed stoker are discussed; principal chemical factors controlling combustion of solid fuel; time factor of combustion; 10 important functions that must be performed in operation of mechanical stokers; ash and clinker disposal. Includes excerpts from paper presented by Am. Eng. Co. before Mech. Division of Stone and Webster, Inc.

T

TEXTILE MILLS

Water Utilization. The Value of Water in Textile Mills for Purposes Other Than Water Power, C. T. Main. Am. Soc. Mech. Engrs.—Textile Div. Paper for mtg., May 22, 1928, 5 pp. Full text of paper previously annotated from Textile World, May 26, 1928. See also Textile World, vol. 73, no. 21, May 26, 1928, pp. 121–122, 145, and 147.

TIDAL POWER

Utilization. Tidal Power, and Turbines Suitable for Its Utilization, A. H. Gibson. Engineering (Lond.), vol. 125, no. 3258, June 22, 1928, pp. 785–786 and (discussion) 759. One of most important problems is that of storage; enumerates various systems; another problem is that of best size and type of turbine and turbine setting for use in tidal scheme; question of d.c. versus a.c. generation. Abstract of paper read before Instn. Civil Engrs. See also Engineer (Lond.), vol. 145, no. 3780, June 22, 1928, p. 680.

TOOLMAKING

Cost Control. Control of Costs of Building Tools, G. A. Pennock. Mech. Eng., vol. 50, no. 7, July 1928, pp. 534–536. Outline of plan employed by Hawthorne Works of Western Electric Company in accelerating output of work involved in manufacture and repair of tools; estimating plan; application of time standards; examples illustrating economies effected.

TOOLS

Maintenance and Repair. Make Tool Repair Costs Part of Production, A. Stuber. Factory and Indus. Mgmt., vol. 76, no. 1, July 1928, pp. 70–73, 4 figs. Account of system by which Eastman Kodak Co., not only estimates costs but controls in advance repairs of large variety of dies and other tools.

TUBES, SEAMLESS

Manufacture. Compare Economic Features of Seamless Tube Manufacture, R. C. Stiefel and G. A. Pugh. Iron Trade Rev., vol. 82, no. 25, June 21, 1928, pp. 1602–1605, 6 figs. Pilger and automatic-mill processes of manufacturing seamless tube compared; pilger process in use chiefly in Europe and automatic or plug-mill process in United States; expanding method will permit production of large-size tubes up to about 24-in. diam. at little additional power requirement and with initial plant cost equal to cost of plant for direct production of tubes. From paper presented before Am. Soc. Mech. Engrs.

TURBO-GENERATORS

Improvements. Recent Improvements in Trubine Generators, S. L. Henderson and C. R. Soderberg. Am. Inst. Elec. Engrs.—Jl., vol. 47, no. 6, June 1928, pp. 411–415, 6 figs. During last few years there has been very rapid increase in rating of turbo-generators; summary of problems which have been encountered, and solved, by engineers of Westinghouse Elec. & Mfg. Co.; present status of design of turbo-generators and probable directions of future developments.

V

VALVES, POPPET

Manufacture. Poppet Valves Made in One Piece, C. A. McGroder. Iron Age, vol. 121, no. 25, June 21, 1928, pp. 1753–1754, 3 figs. Heading machines and large coining presses employed by Dodge Bros., Inc., in producing complete poppet valve; chrome-silicon alloy rods put through heading, coining and other operations; only 1/2-oz. variation in weight between blank and finished valve.

VENTILATION

Static Pressure. Dynamic Significance of Static Pressure, G. De Bothezat. Heat. and Vent. Mag., vol. 25, nos. 5 and 6, May and June 1928, pp. 65–67 and 75 and 79–83, 3 figs. Defines terms and explains phenomena fundamental in ventilation; qualitative relation between pressure and flow velocity in steady stream; quantitative relation between fluid velocity and fluid pressure; flow of air in ducts; air flow through fan; air flow through wind-mill.

W

WOODWORKING PLANTS

Dust Collection. The Dust-Collecting System. Wood-Worker, vol. 47, no. 4, June 1928, pp. 33–34. To install thoroughly good dust-collecting system, knowledge of actual plant conditions and requirements is invaluable; ordinary exhaust fan is designed to serve primarily as collector of refuse; nothing contributes so much to comfort of employees in woodworking plants as efficient dust-collecting system.

THE ENGINEERING INDEX

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Mechanical Engineering Section

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ABRASIVES

Specifications. Coated Abrasive Data Prepared. Abrasive Industry, vol. 9, no. 8, Aug. 1928, pp. 210-212. United States Government issues proposed master specifications for materials purchased for various Federal departments; comments and criticism invited; proposed United States government master specifications for waterproof garnet paper, artificial waterproof abrasive paper, and revision of master specifications for emery cloth.

AERONAUTICAL INSTRUMENTS

Naval. Aircraft Instruments, T. C. Lonnquest. Aviation, vol. 25, no. 2, July 9, 1928, pp. 107 and 129-134, 4 figs. Typical airplane instrument equipment as installed in naval aircraft; service instruments as distinguished from experimental, test or aerological instruments; power-plant instrument equipment; compass, turn and bank indicator and air-speed indicator absolutely necessary for blind flying; details of magnetic direction indicator; three important uses of turn indicator in blind flying; drift indicators and aircraft sextants; production of service aircraft instruments.

AGRICULTURE

Mechanical Power. Power in Agriculture, E. A. Stewart. Am. Soc. Mech. Engrs.—advance paper for mtg. Aug. 27-30, 1928, 5 pp., 6 figs. It is a striking fact that world's oldest industry should be least developed from standpoint of mechanical power; things already accomplished by application of power to farming that lead to prediction of what power farming can do; use of large farm machine units, driven by mechanical power, has increased rapidly during past few years; use of power in agriculture is seasonal; power factor is low, but when agriculture is properly managed from engineering standpoint, load factor can be doubled and trebled, and fixed charges for power reduced accordingly.

AIR BRAKES

Report. Report of Committee on Brakes and Brake Equipment. Ry. Age (Daily Edition), vol. 84, no. 25C, June 26, 1928, pp. D114-D118, 9 figs. Analysis is made of paper on braking power presented at 1927 convention of Air Brake Assn.; braking power on refrigerator cars; loaded weights have wide variation; coefficient of friction for cast-iron and steel wheels; standardization of brake levers now impracticable; braking-ratio recommendations.

AIR COMPRESSORS

Centrifugal. Centrifugal Compressors with Cooled Casings (AEG - Electro - Kreiselkompressoren mit Gehaeuskuehlung). V.D.I. Zeit. (Berlin), vol. 72, no. 17, Apr. 28, 1928, p. 57, 3 figs. Use of electrically driven centrifugal compressors is steadily extending in coal mines; A.E.G. of Germany has developed range of machines in capacities from 180,000 to 1,050,000 cu. ft. of free air per hour, with delivery pressures up to 120 lb. per sq. in.; cooled casings are employed; construction has only been made possible by refinements in foundry practice. See brief translated abstract in Colliery Eng. (Lond.), vol. 5, no. 52, June 1928, p. 252.

AIR CONDITIONING

Evaporation Charts. Solution of Evaporation Problems in Light of Modern Research (Die Berechnung der Verdünstungsvorgaenge auf Grund neuerer Forschungen), F. Merkel. Sparwirtschaft (Vienna), no. 6, June 1928, pp. 312-317, 18 figs. Use of charts for solving problems in evaporation; diagrams and formulas for various cases of evaporation encountered in air conditioning; humidification and dehumidification; heating and ventilation; drying process studied graphically.

AIRCRAFT

Ornithopters. Is the Ornithopter Possible? W. O. Manning. Airways (Lond.), vol. 4, no. 11, July 1928, pp. 397-398, 3 figs. Helicopters, Autogiro, and ornithopter are compared with airplanes; opinion expressed that exact copies of nature are nearly always failures; as no flapping-wing machine has ever yet been produced which can be compared as to efficiency with airplane, conclusion is that man-power flight on former type is impossible.

Protective Coatings. Finishing Modern Aircraft, R. C. Martin. Chem. and Met. Eng., vol. 35, no. 7, July 1928, pp. 404-405, 3 figs. Two distinct types of materials used on wings and fuselage of airplanes are known as acetate and nitrate dope; word, dope, generally refers to combination of cellulose derivative blended with common esters and solvents such as acetone and benzol; on all-metal plane ultimate type of protective coating will probably be compounded on nitrocellulose base; dopes for gas bags and airships.

AIRCRAFT ENGINES

Compression - Ignition Research. High-Speed Compression-Ignition Engine Research, H. B. Taylor. Royal Aeronautical Soc.—Jl. (Lond.), vol. 32, no. 211, July 1928, pp. 555-570 and (discussion) 571-595, 18 figs. Tests of high-speed compression-ignition engines at Royal Aircraft Establishment described and prospects of such engines for aeronautical use shown; main problem in development was that of fuel-injection system; tests of various sprayers; as torque is reduced so is specific fuel consumption; utilization of cheap fuels having high flash point. Paper presented at joint meeting of Instn. of Automobile Engrs. and Royal Aeronautical Soc.

Exhaust Silencers. Engine Exhaust Silencers. U. S. Naval Inst.—Proc., vol. 54, no. 8, Aug. 1928, pp. 701-706, 9 figs. Most American engine manufacturers do not supply exhaust manifolds; noises can be eliminated from engine exhaust by slowly reducing velocity of burned gases; standard on Fairchild planes; bayonet or cone type of exhaust-pipe opening developed by Curtiss Aeroplane and Motor Co.; tests made on Liberty engine; another type of muffler is whirl type; ultimate muffler will be of venturi type or long exhaust-pipe fitted with special ends.

Manufacturers' Specifications. Manufacturers' Specifications on Engines Available for Commercial Use as Compiled by Aviation. Aviation, vol. 25, no. 2, July 9, 1928, p. 122. One-page table of manufacturers' specifications for aircraft engines.

Supercharging. Aircraft Engine Superchargers, A. L. Berger. Aero Digest, vol. 13, no. 1, July 1928, pp. 98 and 100, 7 figs. Purpose of supercharger as applied to aircraft engines is to fully or partially restore sea level density before air enters engine cylinders; remarkable improvement in engine performance obtained; details of centrifugal type and Roots or rotary displacement type superchargers investigated and developed by Army Air Corps; pressure and suction methods of supercharging; controlling output; adapting supercharger to airplane.

Testing (Wright). The Drag of A J-5 Air-Cooled Engine, F. E. Weick. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 292, July 1928, 4 pp., 5 figs. Tests of drag due to Wright Whirlwind engine, mounted on cabin-type airplane, made in 20-ft. N.A.C.A. Propeller Research Tunnel; drag obtained with three different types of exhaust stacks; drag due to engine found to be 85 lb. at 100 m.p.h. with individual stacks, and 83 lb. at 100 m.p.h. with each of collector rings.

Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

AIRCRAFT PROPELLERS

Design of Airfoil Sections. Section Properties of a Series of Airfoils Suitable for Propeller Design, F. W. Caldwell. Air Corps Information Circular, vol. 6, no. 597, Nov. 1, 1928, 21 pp., 23 figs. Section properties for series of sections similar to Clark Y section are given for use in propeller design; sections based on same median line, camber ratio being increased above and below; areas, center of gravity location, and moment of inertia determined by integrating machine; moment of inertia about axis parallel to chord checked by computation.

Design (Gloster Hele-Shaw Beacham). The Variable Pitch Airscrew with a Description of a New System of Hydraulic Control, H. S. Hele-Shaw and T. E. Beacham. Royal Aeronautical Soc.—Jl. (Lond.), vol. 32, no. 211, July 1928, pp. 525–536 and (discussion) 537–554, 9 figs. Description of Gloster Hele-Shaw Beacham variable-pitch airscrew; pitch of blades varied by means of double-acting hydraulic piston operated by oil pressure from variable-stroke pump driven by engine; stroke of pump controlled by governor; pitch of airscrew sets itself so as to keep engine running at constant predetermined speed; speed of governor can be altered by pilot.

AIRPLANES

Brakes. Landing and Braking of Airplanes (L'atterrissage et le freinage des avions), L. Breguet. Académie des Sciences—Comptes Rendus (Paris), vol. 186, no. 23, June 4, 1928, pp. 1516–1518. Braking in air is described and some experiments with planes landing with wheel brakes.

Control, Automatic. Semi-Automatic Piloting of Airplanes (Le pilotage semi-automatique des avions), R. Mioche. Aeronautique (Paris), vol. 10, no. 108, May 1928, pp. 155–158, 5 figs. Three types of servo-pilots in use: electric, compressed air, or oil; description of each and its method of controlling flight.

Design. The Application of Aerodynamic Data to the Structural Design of Aircraft, F. Radcliffe. Flight (Lond.), vol. 20, no. 25, June 21, 1928; (Aircraft Engr.), pp. 464c–464g, 7 figs. Derivation of lift, drag and moment curves of given airfoil for application to stressing wings, body and tail of aircraft; data derived both graphically and algebraically; corrections for effect of wind-channel walls on characteristics; correction to drag, angle of incidence and pitching moment; derivation of individual upper and lower wing characteristics from biplane results. Bibliography.

Wind-Tunnel Tests. Preliminary Biplane Tests in the Variable Density Wind Tunnel, J. M. Shoemaker. Nat. Advisory Committee for Aeronautics—Tech. Note, no. 289, June 1928, 15 pp., 7 figs. on supp. plates. Biplane cellules using N.A.C.A.-M6 airfoil section tested in N.A.C.A. variable-density wind tunnel; three cellules differing in amount of stagger tested at two air densities; indications that positive stagger increases induced drag, decreases maximum lift at Reynolds numbers near full scale, and displaces moment coefficient in positive direction.

Wings. Aerodynamic Characteristics of Thin Empirical Profiles (Caracteristiques aérodynamiques des profils empiriques minces), M. Toussaint and M. Carafoli. Aérophile (Paris), vol. 36, no. 11–12, June 1–15, 1928, pp. 179–183, 4 figs. Applications to fins and curved ailerons of method proposed by Munk; principle of method; aerodynamic characteristics.

Choice of Profile for the Wings of an Airplane, A. Toussaint and E. Carafoli. Nat. Advisory Committee for Aeronautics—Tech. Memo., nos. 468 and 469, June 1928, 45 pp., 18 figs. Essential elements for drawing theoretical profiles to answer actual problems; wing profiles, thus conceived and investigated, have verified theoretical predictions in laboratory and flight tests; practical method for drawing theoretical wing profile with sharp trailing edge; practical choice of number of terms of transformation function. From Aéronautique, Dec. 1927, and Jan. 1928.

AIRPORTS

Railroad Control. Railroads and Airplanes, H. H. Thompson. Ry. Jl., vol. 34, no. 7, July 1928, pp. 33–35, 2 figs. Need at present time for proper guidance of various towns and cities of United States in selecting sites and determining what prospects of such airport will be; assuming that railroads will sometime in future operate air transport lines; airport will be located near or on main line of operating railroad company; cities which are railroad and shipping centers should locate and set aside one or more sections of ground large enough to qualify in future as AAA airport.

AIRSHIPS

Ballast Recovery. Recovery of Ballast on Board Dirigibles (La récupération du lest à bord des dirigeables), A. Tourrette. Aeronautique (Paris), vol. 10, no. 108, May 1928, pp. 160–164, 4 figs. Examines possible solutions of problem of increasing or reducing powers of dirigible; recovery of ballast in flight; technical solution of problem; air and water radiators; choice of systems.

ALLOY STEELS

Titanium Content. Alloys of Iron with Titanium (Beitraege zur Kenntnis der niederigprozentigen Legierungen des Eisens mit Titan), H. Mathesius. Stahl u. Eisen (Duesseldorf), vol. 48, no. 26, June 28, 1928, pp. 853–858, 13 figs. Investigations show that titanium has favorable influence on steel; carbon-poor steel alloy with titanium is superior to ordinary carbon steels; main improvements in investigated steel were: reduction of segregation, increase of elastic limit to 80 per cent of tensile strength as compared to 55 per cent with ordinary carbons; increase of wear resistance and notch strength.

ALLOYS

Age Hardening. Age-Hardening of Alloys, R. Hay. Am. Metal Market, vol. 35, no. 134 (2nd section), July 14, 1928, pp. 10–11 and 23. Treats of influence of various operations on age-hardening effect; temperature, size of particle; application of age-hardening. Paper presented before Scottish Local Section of Inst. on Metals.

Aluminum. See ALUMINUM ALLOYS.

Bronzes. See BRONZE.

Copper. See COPPER ALLOYS.

Chromium. See CHROMIUM ALLOYS.

Nickel. See NICKEL ALLOYS.

ALUMINUM ALLOYS

Aircraft. "Laboratory" Light Alloys and Their Production Commercially. Flight (Lond.), vol. 20, no. 25, June 21, 1928, pp. 470–471, 7 figs. System employed by High Duty Alloys, Ltd. in producing high-tensile aluminum alloys; Hiduminium, Y and DV alloys, made to D.T.D. specification 18A, are supplied to British and foreign aircraft firms; alloys produced under ideal conditions; extraordinary care and control maintained from beginning to end; works are large-scale laboratory rather than foundry and laboratory methods are employed throughout; daily record of foundry melting.

Automotive Engines. Aluminum Alloys in Engine Construction (Aluminiumlegierungen im Motorbau), H. Steudel. Zeit. fuer Metallkunde (Berlin), vol. 20, no. 5, May 1928, pp. 165–178, 29 figs. Discussion of general advantages of light metals; presents table showing parts of engine which can or cannot be produced from light metal, conditions governing its use and reasons why it can or cannot be used; light-metal pistons; use of malleable alloys; properties of most commonly used alloys.

Crystals. Elastic Properties of Crystals of a Heat-Treated Aluminum Alloy (Festigkeitseigenschaften von Kristallen einer veredelbaren Aluminiumlegierung), R. Karnop and G. Sachs. Zeit. fuer Physik (Berlin), vol. 49, no. 7 and 8, 1928, pp. 480–497, 20 figs. Report from Kaiser Wilhelm Institute of Metals, of Berlin-Dahlem on method of production and on tensile strength, elastic limit and other properties of single crystals of heat treated aluminum alloy containing 5 per cent of copper; X-ray photographs of crystal structure.

Electroplating. Electroplating on Aluminum and Its Alloys, H. K. Work. Metal Industry (N. Y.), vol. 26, no. 7, July 1928, pp. 313–315. Abstract of paper read before Am. Electrochemical Soc., previously annotated.

APPRENTICES

Training. The Apprenticeship-Training Program of the Tri-City Manufacturers, S. M. Brah. Am. Soc. Mech. Engrs.—advance paper for mtg. Aug. 27–30, 1928, 4 pp., 1 fig. Author treats subject in three principal sections: (1) description of community problem; (2) explanation of system of apprenticeship training; (3) results of training under this system; community under discussion commonly known in industrial world as Tri-Cities, includes five cities in two states, having total of 41 companies; cost of courses is $100, payable at rate of $2 per month; if amount is paid in cash, price is $75; gives cost of training for one year.

AUTOMOBILES

Bodies, Aluminum Standards. S.M.M.T. Provisional Standards. Automobile Engr. (Lond.), vol. 18, no. 243, July 1928, p. 260, 5 figs. Provisional standards of Society of Motor Manufacturers and Traders for use of aluminum in automobile body construction; bimetallic contacts, method of fixing aluminum painting, dopes, and condition of wood are covered.

Springs and Suspension. Researches on Springs. Dept. of Sci. & Indus. Research, Eng. Research—Special Report no. 8, 1928 (Lond.), 42 pp., 32 figs. partly on supp. plates. Results of experiments with 30-cwt. and 60-cwt. army truck and with 2-seater high-speed automobile; National Physical Laboratory was asked to design mechanism which could be fitted to vehicle and which would give continuous record with time of displacement of springs relative to body of vehicle when run at different speeds and on different road surfaces; gives description of apparatus and results obtained.

Steering-Knuckle Pivots. Mechanical Principles of Inclined Knuckle Pivots, A. L. Vargha. Automotive Industries, vol. 59, no. 4, July 28, 1928, pp. 130–131, 4 figs. Question of effect of road resistance on knuckle pin in discussions of front-wheel steering, front-wheel brakes, or front-wheel drive, is taken up; when axis of steering knuckle pivot strikes ground at center of tire contact, traction resistance then has no effective lever arm.

Transmission Gears, Lapping. Transmission Gear Lapping. Machy. (Lond.), vol. 32, no. 822, July 12, 1928, pp. 470–472, 4 figs. Improved method of lapping transmission gears is described; why gears wear less at pitch line; advantages of shifting gears while lapping; arrangements of lapping fixture; how lapping motions are derived; many gears previously scrapped were salvaged by method; gear noises reduced.

AUTOMOTIVE FUELS

Anti-Knock Compounds. Engine Knock and Related Problems, A. C. Egerton. Nature (Lond.), vol. 122, no. 3062, July 7, 1928, pp. 20–26, 2 figs. Results of test show that anti-knocks do not affect a rapidly accelerating explosion in tube; that this influences igniting temperatures and it is metal part of organo-metallic anti-knock which is mainly instrumental in action. Discourse delivered at Royal Instn.

B

BALSA WOOD

Utilization. Balsa—Our Newest and Lightest Wood, D. A. Hampson. Wood-Worker, vol. 47, no. 5, July 1928, pp. 52–53, 1 fig. New field and wider uses are opening up for this wood; notes on properties of balsa and best way to fabricate it.

BEARING METALS

Casting. Pouring and Casting of Bearing Metals. Lubrication, vol. 14, no. 6, June 1928, pp. 62–64, 2 figs. Extent to which bearing can be expected to function effectively will depend upon its initial formation; melting metal; preheating of bearing parts; treatment of shells; pouring bearing metals.

BENZOL

Recovery Plants. Modern Coke Plants. Recovery of By-Products; Benzol (Les cokeries modernes. La récupération des sous-produits: Le Benzol). Nature (Paris), no. 2787, June 15, 1928, pp. 535–542, 10 figs. Extractors; removing benzol by washing gas; methods of obtaining benzol and apparatus used are described; also refining of raw benzol.

BOILER FURNACES

Bagasse. Sugar Furnaces, E. W. Kerr. Sugar, vol. 30, no. 7, July 1928 pp. 310–312. Problem is to select installation that will develop desired ratings with efficient utilization of bagasse; in factory with efficient evaporating and heating equipment, bagasse furnishes large proportion of fuel, 95 per cent more or less; bagasse furnaces being of relatively large volume have correspondingly large surfaces; important that bagasse be fed properly both as to amount and regularity; flue-gas analysis.

Design. N.E.L.A. Report on Stokers and Furnaces. Combustion, vol. 19, no. 1, July 1928, pp. 33–34. Report is arranged in standard form adopted; principal phase is in application of automatic combustion control; stokers; water walls and furnaces; air preheaters.

Wood-Waste-Fired. Wood Refuse Burning Over Underfeed Stokers. Power, vol. 68, no. 4, July 24, 1928, pp. 142–143, 1 fig. Boilers are of three-pass, bent-tube type with furnace volume approximately 4200 cu. ft.; wood refuse available from manufacturing plant as valuable auxiliary fuel to be burned practically in suspension on top of stoker fire.

BOILER PLATES

Temperature Effect. Boiler and Container

Materials with Increased Resistance at High Working Temperatures (Kessel- und Behälterhaustoffe mit gesteigerter Widerstandsfaehigkeit bei hohen Betriebstemperaturen), P. Proemper and E. Pohl. Archiv. für das Eisenhüttenwesen (Düsseldorf), vol. 1, no. 12, June 1928, pp. 785–793, 23 figs. Notes on properties of soft vanadium and molybdenum steels at temperatures of 500 deg. cent., in form of rolled steel; short-time tests, and prolonged load tests; machinability; aging; metallographic analysis; corrosion and weldability. See brief abstract in Stahl u. Eisen (Düsseldorf), vol. 48, no. 27, July 5, 1928, pp. 908–909, 1 fig.

BOILERS

Heat Transmission. Heat - Transmission Laws and Conceptions of Modern Boilers (Les lois de la transmission de la chaleur et la conception des chaudieres modernes), C. Roszak and M. Veron. Société des Ingenieurs Civils de France—Compte Rendu Des Travaux (Paris), vol. 81, no. 3–4, 1928, pp. 341–383, 16 figs. General summary of laws of heat transmission in steam boilers; grates with large angular factor of radiation and some examples; means of promoting convection from gas to walls; superheaters.

High-Pressure (Benson). The Benson Process of Generating High-Pressure Steam (Das Benson-Verfahren zur erzeugung hoechstgespannten dampfes), H. Gleichmann. V.D.I. Zeit. (Berlin), vol. 72, no. 30, July 28, 1928, pp. 1037–1046, 21 figs. Principles of Benson process; details of experimental Benson boilers of Siemens-Schuckert plant and Charlottenburg Institute of Technology, generating as much as 3.5 tons of steam per hour; oil, lignite, and pulverized-coal firing of Benson boilers; test data; feedwater problems; design of high-pressure steam plants.

High-Pressure, Paris. A Big Boiler in Paris. Power, vol. 68, no. 3, July 17, 1928, pp. 98–99, 2 figs. Compagnie Parisienne de Distribution d'Electricté 19,400-sq. ft. boiler to evaporate 265,000 lb. of water hour at 615 lb. gage superheated to final temperature of 824 deg. fahr.; this boiler is fired by pulverized coal and equipped with air preheaters and fin-tube walls.

Locomotive. See LOCOMOTIVE BOILERS.

Waste-Heat. Recovery of Waste Heat and Waste-Heat Boilers (La récupération des chaleurs perdues et les chaudières de récupération), M. Varinois. Vie Technique et Industrielle (Paris), vol. 9, no. 105, June 1928, pp. 337–341, 6 figs. Utilization of heat from steel furnaces, recovery of heat lost from gas and Diesel engines; design of boilers for recovery of heat.

BONUS SYSTEMS

Group. A Cooperative Production Scheme, G. W. Tripp. Engineer (Lond.), vol. 146, no. 3783, July 13, 1928, pp. 30–31. In Priestman-Atkinson system of collective bonus, each man or group reaps benefit of his or its personal efforts; scheme has been in operation for over ten years in works of Priestman Brothers.

BRONZE

Alloys. Alloys Affect Properties, E. R. Thews. Foundry, vol. 56, no. 13, July 1, 1928, pp. 532–535. Gives effect of various metallic additions such as zinc, lead, nickel, cobalt, manganese, phosphorus, silicon, etc., on casting properties of bronze; cobalt bronzes; tin replaces nickel; Brinell hardness of bronzes is increased from 63 to 71 decreasing to 60 if phosphorus content rises to 0.50 per cent.

C

CADMIUM

Plating. Corrosion Protection of Light Metals by Cadmium (Cadmium als Korrosionsschutz für Leichtmetalle), J. Dornauf. Korrosion u. Metallschutz (Berlin), vol. 4, no. 5, May 1928, pp. 98–102, 20 figs. Corrosion tests of light metals used in aviation, mostly aluminum alloys, protected by cadmium coating vs. other protective coatings show considerable advantages of cadmium.

CARBON DIOXIDE

Mollier Diagram. A Mollier Diagram for Carbon Dioxide, N. H. Hiller, Jr. Ice and Refrig., vol. 75, no. 1, July 1928, pp. 45–50, 8 figs. Its use with regard to simple and multiple-effect compression; charts and indicator diagrams based on Mollier's law on same basis as ammonia charts. Paper read at 5th Int. Congress of Refrigeration held in Rome, Italy.

Refrigerant. Recent Improvements in Carbon-Dioxide Equipment, J. C. Goosmann and F. R. Zumbro. Refrig. Eng., vol. 16, no. 1, July 1928, pp. 1–10, 18 figs. Various features of carbon-dioxide compression system are considered in descriptive fashion; experimental questions previously considered are discussed by author and others; liquefaction of carbon dioxide; carbon dioxide as refrigerant; selective cycle; displacement, theoretical and actual, condensers.

CASE HARDENING

Carburizing. Carburizing with Mixtures of Hydrogen and Natural Gas, W. P. Sykes. Fuels and Furnaces, vol. 6, no. 7, July 1928, pp. 913–918, 20 figs. For a given concentration of methane in hydrogen, temperature of heating and a consequent diffusion rate of carbon through iron is most important factor governing thickness of carburized shell; experiments on Armco Iron; construction of furnace; variation of temperature and atmosphere; factors governing depth of carburization.

Facts and Principles Concerning Steel and Heat Treatment, H. B. Knowlton. Am. Soc. Steel Treating—Trans., vol. 14, no. 1, July 1928, pp. 127–148. Discussion of solid carburizing materials, method of packing carburizing, carburizing protection, reuses of carburizing materials, carburizing furnaces, carburizing containers, gas carburizing, and methods of control of depth of case; action of base materials and chemical energizers in carburizing compounds is explained.

Nitration. Steels for Case Nitrification, A. B. Kinzel. Am. Soc. Steel Treating—Trans., vol. 14, no. 2, Aug. 1928, pp. 248–253 and (discussion) 253–254. Study of effect of various alloying elements on case resulting from low-temperature nitrification; shows particularly extreme hardness and general desirability of case obtained with vanadium steel; treating surface of plain carbon steels with aluminum or vanadium and then nitrifying were investigated and satisfactory cases obtained in this way; properties of steel containing 0.4 per cent vanadium in solid solution make such steel particularly suited to industrial application.

CASEIN

Manufacture. Casein Plastic Material (La caséine matière plastique), M. Fouassier. Nature (Paris), no. 2788, July 1, 1928, pp. 20–22, 5 figs. Manufacture of casein in plates or rods; formaldehyde treatment; uses of hardened casein; market for casein.

CAST IRON

Improvement. High-Grade Cupola Cast Iron (Hochwertiges Kupolofengusseisen), F. Dengler. Zeit. für die Gesamte Giessereipraxis (Berlin), vol. 49, nos. 26 and 27, June 24 and July 1, 1928, pp. 221–223 and 229–231, 17 figs. Author points to uncertainty in continuous production of uniform material; main factors of homogeneous structure are burden, degasification of charge, and cooling conditions of castings; discusses means and methods of improving structure.

Manufacture of High-Grade Cast Iron (La fabrication des fontes résistantes), M. Girardet. Société Industrielle de l'Est—Bul. (Nancy, France), no. 188, Jan.-Feb.-Mar. 1928, pp. 5–23, 1 fig. Composition of mixture; action on graphite; use of single cupola; accessories to improve cupola castings; shaking hearth of Dechesne for desulphurizing of cast iron, and its mode of operation; gyratory hearth according to author's system. Bibliography.

Testing. Engineering Tests for Cast Iron, J. G. Pearce. West of Scotland Iron and Steel Inst.—Jl. (Glasgow), vol. 35, part 5, Feb. 1928, pp. 80–90, 4 figs. partly on supp. plates. Considers mechanical tests for cast iron from point of view of metallurgical desirability and practical convenience; indicates briefly logical development of considerations which have resulted in new specifications; shape of test bar; respective merits and demerits of tensile and transverse test; shear test; relations between tests.

CHEMICAL ENGINEERING

Developments. The Genesis of Industrial Chemistry, A. D. Little. Technology Rev., vol. 30, no. 8, July 1928, pp. 481–485, 7 figs. Survey of chemical industry, past and present; rough outline presented of development of alkali industry serves to illustrate factors upon which its growth depends; review of growth of DuPont Co.; important trend toward utilization of petroleum and natural gas as raw materials for chemical syntheses; another definite trend is toward processes employing ultra-violet light and other forms of radiation to promote reactions not otherwise easily induced; chemistry pervades all industries.

CHROMIUM ALLOYS

Chromium-Copper Steel. The Development of High-Grade Structural Steel (Zur Fortentwicklung des hochwertigen Baustahles), E. H. Schulz. Stahl u. Eisen (Düsseldorf), vol. 48, no. 26, June 28, 1928, pp. 849–853, 4 figs. Discussion of development and properties of structural steel; strength, corrosion resistance, and technological properties of new chromium-copper structural steel with 0.5 to 0.8 per cent copper, 0.4 per cent chromium, and 0.15 per cent carbon, having strength properties of silicon steel with 1 per cent silicon.

Chromium-Nickel Steel. A Note on the Hardness and Impact Resistance of Chromium-Nickel Steel, B. F. Shepherd. Am. Soc. Steel Treating—Trans., vol. 14, no. 1, July 1928, pp. 67–71, 1 fig. Results are given of Izod impact, hardness, and tensile tests of chromium-nickel steel of S.A.E. 3250 type with varying nickel and carbon content; higher carbon reduces resistance to impact without production of increased hardness; tempering to 300 deg. fahr. increases impact resistance without materially affecting hardness but best use of this type of steel is with 550- deg. fahr. temperature.

COAL

By-Products. Increasing Coal Value (Die Auswertung der Kohle), O. Huppert. V.D.I. Zeit. (Berlin), vol. 72, no. 28, July 14, 1928, pp. 975–983, 8 figs. Synthetic ammonia by Haber-Bosch process; sulphate of ammonia and sodium salpeter as by-products; distillation of coal; hydrogen by Bronn-Linde-Concordia process; low-temperature-tar process; Prud'homme process; obtaining liquid fuels with carbon monoxide; gas generators working with oxygen; hydrogenation of coal and tars; coke-oven water gas.

Carbonization, Low-Temperature. A General Review of Low-Temperature Carbonisation, F. S. Sinnatt. Fuel (Lond.), vol. 7, no. 7, July 1928, pp. 305–317. Objects of paper are to examine products of chief processes of low-temperature carbonization, and to collect suggestions as to ways in which products can be utilized; gives list of plants of which large-scale units exist in Great Britain using different processes.

Carbonization, Lurgi Process. Lurgi's Distillation Process (Das Lurgi-Schwelverfahren), F. A. Oetken and O. Hubmann. Montanistische Rundschau (Berlin), vol. 20, no. 14, July 16, 1928, pp. 425–430, 5 figs. Description of modern German method of coal distillation introduced by Lurgi Combustion Engrg. Co. of Frankfort-on-Main, used for lignite, peat, and similar fuels in current of hot gases; examples of installations for daily capacities of, respectively, 25, 120, 360, and 500 tons per 24 hr.

Carbonization, Research. The Influence of Inorganic Constituents in the Carbonization and Gasification of Coal, J. J. Priestley and J. W. Cobb. Gas Jl. (Lond.), vol. 182, no. 3396, June 16, 1928, pp. 951–954, 5 figs. Liberation of sulphur; table showing hydrogen sulphide evolved on carbonization in nitrogen (sulphur in coal, 0.89 per cent); table of results in hydrogen; preliminary experiments made with cokes prepared at 500 deg. cent.; analysis of coal used; description of apparatus; method of working. Report on fellowship work, Instn. Gas Engrs.

Distillation. Oils from Shale, Lignite and Coal, J. W. Horne and A. D. Bauer. Oil and Gas Jl., vol. 27, no. 7, July 5, 1928, pp. 168 and 170 and 172 and 174–177, 1 fig. Results of general study being conducted by U. S. Bureau of Mines and cooperating associates in Colorado, on yields and properties of oils produced from oil shale, lignite and sub-bituminous coals, using Bureau's standard assay method; samples chiefly obtained from Rocky Mountain States; some shale from Kentucky, Scotland, Brazil and Australia; tabulated analyses; description of apparatus and procedure; discussion of results.

Distillation, Low-Temperature. Manufacturing Oil from Oil Shale and Bituminous Coal, G. W. Wallace. Combustion, vol. 19, no. 1, July 1928, pp. 23–28, 4 figs. Description of Dundas-Howes process; low-temperature distillation of oil shale and bituminous coal; units in Santa Barbara County, Calif.; general arrangement of N-T-U Company's plant in California; capacity of plant is 200 tons per day; cost of operating plant.

Pulverizers. How Does a Coal Pulverizer Do Its Job? J. K. Blum. Power, vol. 68, no. 3, July 17, 1928, pp. 100–102. Author analyzes performance of coal pulverizing mills and shows how to study given mill and how to estimate its measure of excellence; fundamentals; practical application.

Spontaneous Combustion. Spontaneous Heating of Coal, J. D. Davis and D. A. Reynolds. U. S. Bur. of Mines—Tech. paper, no. 409, 1928, 74 pp., 20 figs. Purpose of paper is to assemble results of investigations, previously reported on in part, and correlate with those of other investigations; review of previous investigations; theory of spontaneous heating; relative tendency

of various coals to oxidize; methods for determining such tendency; oxidation of banded constituents and of those separable by solvents; weathering; effect of preheating; factors affecting spontaneous heating of coal; recapitulation. Bibliography.

COPPER ALLOYS

Copper-Nickel Alloys. Copper-Nickel Alloys. Machy. (Lond.), vol. 32, no. 821, July 5, 1928, pp. 450–451. Properties and industrial applications of copper-nickel alloys; addition of relatively small amounts of nickel increases hardness of copper and its resistance of oxidation at elevated temperatures; influence of carbon, sulphur, and manganese; corrosion-resisting property.

Heat Treatment. The Effect of Heat Treatment on Some Mechanical Properties of 86:4:6:3:1 Copper-Nickel-Tin-Zinc-Lead Alloy, R. J. Anderson. Am. Metal, vol. 35, no. 134 (2nd Section), July 14, 1928, pp. 1–3 and 14, 12 figs. Object of present investigation was to examine effect of heating at different temperatures and for various periods of time, followed by air cooling, on tensile properties and hardness of sand-cast alloy having nominal composition 86:4:6:3:1 copper-nickel-tin-zinc-lead; method of investigation; results of tests. Selected bibliography.

CRANKSHAFTS

Stiffness Calculation. An Empirical Formula for Crankshaft Stiffness in Torsion, B. C. Carter. Engineering (Lond.), vol. 126, no. 3261, July 13, 1928, pp. 36–39, 2 figs. Formula put forward was evolved from results of stiffness tests on crankshafts of marine, aricraft and automobile types; in all cases shafts were twisted in bearings with clearances approximating to those used in ordinary working, and all stiffness relate to transmitted torque.

D

DIE CASTING

Metals and Alloys. A.S.T.M. Report on Die Cast Metals and Alloys. Am. Metal Market, vol. 35, no. 134 (2nd section), July 14, 1928, pp. 16–21, 1 fig. Cooperating producers; cooperating testing laboratories; standardize certain variables; standardization of tension testing procedure; information is also needed regarding relative corrosion resistance of various die-casting alloys; standard testing procedure specifications for Rockwell special "E" scale. Report presented before Am. Soc. of Testing Materials.

DIES

Hardening. Hardening Cold Heading Dies, L. S. Cope. Am. Soc. Steel Treating—Trans., vol. 14, no. 1, July 1928, pp. 51–60, 11 figs. Author describes quenching apparatus which has been successfully used to quench die so that portion around hole will be hard to withstand wear and remainder of die will be soft enough to withstand shock produced by cold heading; pair of tongs is also described by which header hammers may be quenched so that ends only will be hardened.

DIESEL ENGINES

Fuel Injectors. Manufacture of Diesel Fuel Injectors, C. R. Alden. Am. Soc. Mech. Engrs.—advance paper for mtg., June 14–16, 1928, 5 pp., 7 figs. Need for extreme accuracy in certain parts of fuel-injection system is keenly realized; it is author's opinion that designer and builder have been slow to cooperate to their maximum advantage. Read at National Oil and Gas Power Mtg. See also Motorship, vol. 13, no. 7, July 1928, p. 581.

Heat Transmission. Variation in the Rate of Heat Transmission in a Sulzer Marine Diesel Engine During One Revolution. Sulzer Tech. Rev. (Winterthur, Switzerland), no. 2, 1928, pp. 11–15, 19 figs. Rate of heat transmission between products of combustion and cylinder walls; actual flow in cylinder can be subdivided according to manner in which it originates.

Hesselmann. AEG-Hesselman Airless-Injection Diesel Engines, F. Sass. Eng. Progress (Berlin), vol. 9, no. 7, July 1928, pp. 195–199, 13 figs. These engines, developed in last few years, are characterized by specially appropriate shape of combustion chamber; automization is accomplished by injection under high liquid pressure of 1500 lb. per sq. in.; four-stroke and two-stroke.

High-Speed. The High-Speed Diesel Engine as a Competitive Power Generator, C. E. Lucke. Soc. Automotive Engrs.—Jl., vol. 23, no. 1, July 1928, pp. 46–49, 2 figs. Diesel oil engine analyzed as competitor of steam and gasoline engine, in stationary power field and in field of marine and land transportation on bases with suitability for purpose, and cost of performing required service; prospects of useful economic results of automotive Diesel engine so favorable that almost any effort to adapt it to needs would be justified now; adaptability to great variety of liquid fuels.

Large. The Economic Field for Large Diesel Engines, E. B. Pollister. Am. Soc. Mech. Engrs.—advance paper for mtg., June 14–16, 1928, 7 pp., 10 figs. Important market analysis by one of foremost executives in Diesel industry; large Diesel may be considered as of from 2500 to 25,000 b.hp.; estimate of cost of 4-unit 15,000-b.hp. 10,000-kw. Diesel installation; use of large Diesel by public utilities has been alone considered. See also Motorship, vol. 13, no. 7, July 1928, p. 582; and Oil Engine Power, vol. 6, no. 7, July 11, 1928, pp. 446–452, 7 figs. Read at Nat. Oil and Gas Power Mtg.

Manufacture. Specialization in Manufacturing Diesel Engines, O. D. Treiber. Am. Soc. Mech. Engrs.—advance paper for mtg., June 14–16, 1928, 2 pp. Diesel-engine industry has very good supply of specialty products to draw from; ability to obtain specialty products from various shops will undoubtedly have tremendous bearing on reduction of Diesel-engine costs; various parts of Diesel engine can be classified. Presented at National Oil and Gas Power Mtg. See also Motorship, vol. 13, no. 7, July 1928, p. 579.

Power Plants. Some Considerations Regarding the Peak-Load Problem and High-Powered Peak-Load Diesel Engines, M. Gercke. Diesel Engine Users Assn. (Lond.)—Paper no. S85, 1928, pp. 1–22 and (discussion) 23–51, 17 figs. Load conditions of some typical German electric power plants; economical effect of peak loads on efficiency of steam power plants; peak-load equipments; general comparison of "primary" and "secondary" peak-load installations; individual comparison of primary peak-load units; application of high-powered gas engines for peak-load purposes. See abstract in Combustion, vol. 19, no. 1, July 1928, pp. 33–34.

Pulverized-Fuel. The Coal-Dust Engine Upsets Traditions, R. Pavolikowski. Power, vol. 68, no. 4, July 24, 1928, pp. 136–138, 4 figs. Engine burning pulverized coal has been developed in Germany; operates equally well with pulverized coal or oil or with mixture of two; initial compression of 440 lb. abs.; delivers 1 b.hp. on 8000 B.t.u. of pulverized coal; 3-cylinder Diesel arranged with pulverized-coal attachments; operation described briefly; Diesel advantages retained.

Powdered Fuel in Diesel Engines. Times Trade and Eng. Supp. (Lond.), vol. 2, no. 521, June 30, 1928, p. 395. Of recent years progress has been made at Kosmos works and trial engine of fair size built to plans of R. Pavolikowski has been running for some time; combustion is now so good that only entirely non-combustible matter remains as very fine dust, which is blown out with combustion gases; only about 8000 B.t.u. required for one horsepower per hour.

Small. Economic Field for Small and Medium Size Diesel Engines, H. A. Pratt. Am. Soc. Mech. Engrs.—advance paper for mtg., June 14–16, 1928, 6 pp. Discussion of smaller units; unusual results obtained in tugboat service; Diesel-electric tug Meitowax compared with modern steam oil-burning tug; daily fuel consumption on Diesel tug of 480 gal. cost $24 and on steam tug, fuel consumption of 2314 gal. cost $104; lays down fundamental factors determining desirability of installing Diesel engines. Presented at Oil and Gas Power Mtg. See also Mar. Eng. & Shipg. Age, vol. 33, no. 7, July 1928, 6 pp.

Supercharging. Tests on a Diesel Engine with Büchi Turbo-Charging. Analysis of Results, A. Stodola. Mar. Engr. and Motorship Bldr. (Lond.), vol. 51, no. 611, July 1928, pp. 265–268, 9 figs. Fuel consumption amounts to 0.391 lb. per b.hp. per hour; turbo-supercharging improves specific fuel consumption of engine tested by about 4 per cent; calculation of charging air quantity; results of tests on six-cylinder four stroke-cycle single-acting Diesel with Büchi exhaust-gas turbine charging.

DISKS, ROTATING

Stress Analysis. A Simplified Method of Determining Stresses in Rotating Disks, M. G. Driessen. Am. Soc. Mech. Engrs.—advance paper for mtg., Aug. 27–30, 1928, 5 pp., 7 figs. Problem of determination of stresses in revolving disk is discussed; manner by which results once obtained can be used for different loads at circumference and for different speeds is indicated; disadvantages in Donath method of determining stresses in rotating disks, such as disks of steam turbine rotors, are shown.

E

ENGINEERING MATERIALS

Specifications. Specifications and Procurement of Manufacturing Materials, D. F. Miner. Am. Mach., vol. 69, no. 2, July 12, 1928, pp. 37–40. Description of methods employed by Westinghouse Elec. & Mfg. Co., showing how design engineer coordinates efforts to obtain best material for products; although responsibility for material rests on one capable executive, choice is actually result of suggestions from all departments.

F

FEEDWATER HEATERS

High-Pressure. High Pressure Feed Water Heaters for Philo. Heat. Eng., vol. 3, no. 6, June 1928, pp. 10–11, 2 figs. Feedwater will be heated by stage feedwater heaters to temperature of 320 deg. fahr.; each heater will be supplied with bled steam at 100 lb. per sq. in. absolute; water spaces of heaters designed for 900 lb. working pressure; water ends made up entirely of rolled steel.

FLIGHT

Birds. Scientific Studies of Bird Flight, M. Boel. Am. Soc. Mech. Engrs.—advance paper for mtg., June 28–29, 1928, 6 pp. Outline of experimental work on birds of various kinds to determine their methods of flight with intent of applying them to airplane flight; paper presented is only general synopsis of original paper which is to follow after meeting in Detroit.

FLOW OF FLUIDS

Pipes. The Flow and Measurement of Petroleum Products in Pipe-Lines, S. W. Adey. Inst. Petroleum Technologists—Jl. (Lond.), vol. 14, no. 67, Apr. 1928, pp. 222–235, 3 figs. Mathematical discussion on measurement of flowing gas and oil.

The Flow of Fluids in Pipes, E. S. L. Beale and P. Docksey. Instn. Petroleum Technologists—Jl. (Lond.), vol. 14, no. 67, Apr. 1928, pp. 236–262, 3 figs. Mathematical discussion on theory of flow of fluids of different viscosities in pipes of various materials; temperature factors; viscosity-temperature charts; example of calculation, using given conversion formulas and graphs.

FLUE-GAS ANALYSIS

Density Meters. Siemens Smoke-Density Meter (Der Siemens-Rauchdichteanzeiger), H. Miething. Siemens-Zeit. (Berlin), vol. 8, no. 4, Apr. 1928, pp. 245–251, 11 figs. Discussion of smoke problem; description of Siemens and Halske ardometer for measurement of smoke density of chimney flue gases; comparison with American methods; Ringelmann smoke-density chart; schematic arrangement of ardometer and its optical system; schematic calibration arrangement; filter; ardometer curve in relation to actual smoke density; numerical examples of tests.

FUELS

Technology. Modern Fuel Technology, D. Brownlie. Motor Transport (Lond.), vol. 46, no. 1215, June 25, 1928, pp. 781–782. Rapid advances in fuel research of great importance to British development of motor transport because of tax on imported motor fuel; fuels from bituminous coal; low-temperature carbonization; hydrogenation and synthetic processes; activity on Continent; steam vehicles and producer gas fuel; need for intensified research.

FURNACES, INDUSTRIAL

Walls. Optimum Thickness of Furnace Walls (Ermittlung günstigster Wanddicken von Industrieöfen), H. Repky. Archiv. für Wärmewirtschaft (Berlin), vol. 9, no. 5, May 1928, pp. 145–149, 9 figs. Mathematical discussion dealing with heat losses by conductivity radiation, etc.; proper wall thickness for various operating conditions; analysis balancing cost of masonry and thermal insulation against higher operating costs due to heat losses.

G

GARAGES

Ventilation. Ventilating Garages to Remove Exhaust Fumes. Travelers Standard, vol. 16, no. 7, July 1928, pp. 147–150, 1 fig. Description

of satisfactory systems installed garages to remove dangerous fumes and thus prevent carbon-monoxide poisoning.

GASES

Combustion. Gaseous Combustion at High Pressures, D. M. Newitt. Roy. Soc. Proc. (Lond.), vol. A119, no. A782, June 1, 1928. pp. 464–480, 2 figs. Discussion of co-volume corrections, maximum temperatures and dislocation of steam and carbon dioxide in explosions.

GASOLINE

Properties. How and Why of Gasoline Performance, J. B. Hill. Oil and Gas Jl., vol. 27, no. 8, July 12, 1928, pp. 78 and 116 and 119–120, 2 figs. Properties required by engine are points covered suitably by volatility and detonation tests; odor, corrosive qualities of fuel or exhaust gases, crankcase dilution and formation of solid deposits are important secondary requirements of automobile; color and gravity are not considered in modern tests. Paper presented before Am. Soc. Testing Matls.

GAS TURBINES

Exhaust-Gas. The Diesel-Engine Exhaust Turbine, H. A. Hepburn. Brit. Motorship (Lond.), vol. 9, no. 100, July 1928, pp. 150–151, 2 figs. Suggested method of increasing efficiency by 10 per cent; appears to be sounder proposition for large Diesel engines of 10,000 b.hp. and upward to discharge at constant-exhaust pressure of say two to three atmospheres into receiver from which gases would expand from constant-pressure conditions through nozzle into turbine moving blades shows diagrammatically combined engine and turbine, latter being place in line with cylinders and geared on to main engine shaft.

GEAR CUTTERS

Review of. Gear Cutting and Testing Machines. Am. Mach., vol. 69, no. 3, July 19, 1928, pp. 80–81, 6 figs. Semi-annual résumé of gear-cutting machines described in shop equipment news section during first six months of 1928; details of hobbers, shapers and generators, and testing machines are given.

GEARS

Laminated. Laminated Gears in Industry. Plastics, vol. 4, no. 6, June 1928, pp. 342–349, 1 fig. Contrary to usual lay idea, laminated gears are in use for other and much heavier duties than auto timers; industrial applications; gear types installation.

Lubrication. Influence of Tooth Profile on Gear Lubrication (Einfluss der Zahnform auf die Schmierung bei Wälzzahnraidern), F. G. Altmann. Maschinenbau (Berlin), vol. 7, no. 12, June 21, 1928, pp. 596–600, 14 figs. Comparison of cycloidal and involute systems of gears in respect to friction losses and lubrication, based on experiments made by Guembel in 1926; diagrams showing influence of pitch circles angles of action, and addendum in both systems.

Polishers. Gear Tooth Burnishing. Automobile Engr. (Lond.), vol. 18, no. 243, July 1928, pp. 255–256, 2 figs. Design and operation of machine made by Fellows Gear Shaper Co. for finishing gears of oil-hardening steels; chief object is to smooth working surfaces of gear teeth to reduce frictional resistance of teeth during period of sliding contact; gear to be burnished is supported entirely by burnishing gears and has no bearing on center hole.

Strength Formulas. Modification of the Lewis Formula for Determination of the Strength of Gears, H. T. Davey. Machy. (Lond.), vol. 32, no. 822, July 12, 1928, pp. 465–466. Discussion of formula for determining strength of gears with modifications to provide direct means of solving practical problems; tabulated values of formulas to give direct reading number of teeth.

GRINDING MACHINES

Review of. Grinding Machines. Am. Mach., vol. 69, no. 3, July 19, 1928, pp. 81–86, 28 figs. Semi-annual résumé of grinding machines described in shop equipment news section during first six months of 1928; details of surface, cylindrical, internal, portable, tool, and special-purpose machines are given as well as attachments. For grinding machines in European editions see pp. 129–131.

H

HEAT TRANSMISSION

Laws of. Laws of Heat Transmission by Convection (Les lois de la transmission de chaleur par convection), A. Leveque. Annales des Mines (Paris), vol. 13, no. 5, May 1928, pp. 305–362, 34 figs. Examination and interpretation of principal works on transmission of heat by convection; tests of M. V. Kammerer; problem of gas current inside a tube; experiments of Ser, Nicholson, Josse, Jordan, Nusselt, Poensgen, and comparison of them. (Continuation of serial.)

Solids. Heat Conduction in Solids (Zeichnerische Verfolgung der Wärmeleitung in Festen Koerpern), F. Nussbaum. Zeit. für angewandte Mathematik u. Mechanik (Berlin), vol. 8, no. 2, Apr. 1928, pp. 133–142, 7 figs. Author has developed graphic method of calculating flow of heat through solids which permits fairly accurate solution of uni-dimensional problems, and is also applicable to two-dimensional cases, although procedure is more complicated. See brief abstract in Archiv. fuer Waermewirtschaft (Berlin), vol. 9, no. 6, June 1928, p. 179.

HEATING

Load Analysis. Studying the Heating Load, P. E. Fansler. Heat. & Vent. Mag., vol. 25, no. 7, July 1928, pp. 108–110, 2 figs. Analysis of 1927–1928 heating load brings to light some interesting and valuable facts; study of set of graphs enables one to visualize, as could be done in no other way, flow-of-heat demand; chart can be delineated by separating heating load for heating season into its monthly components; error in degree-day summations.

HYDRAULIC PRESSES

Types. Guide Apparatus, Pressure Reducers and Pressure Transmitters for Hydraulic Presses and Machines (Les distributeurs, réducteurs et multiplicateurs pour presses et machines hydrauliques), A. Lambrette. Technique Moderne (Paris), vol. 20, no. 12, June 15, 1928, pp. 418–424, 17 figs. Treats of types of apparatus used for distribution of water under pressure and indicates their advantage and disadvantage; classification.

HYDRAULIC TURBINES

Testing, Sweden. Arrangements for Tests at the Machine Works in Kristinehamn (Anordningar for provning av turbiner vid Verkstaden Kristinehamn), H. Lind. Tekniska Foreningens I Finland Forhandlingar (Helsingfors), vol. 48, no. 5, May 1928, pp. 103–108, 4 figs. Causes of cavitation; description of cavitation laboratory completed in 1924, and its testing methods; description of high-pressure laboratory and its operation.

HYDROELECTRIC DEVELOPMENTS

Conowingo, Md. The Conowingo Hydroelectric Development on the Susquehanna River, A. Wilson, 3rd. Am. Inst. Elec. Engrs.—Advance paper, no. 55, for mtg. Apr. 17–20, 1928, 8 pp., 9 figs. Project is one of largest hydroelectric developments in United States exceeded in size by Niagara Falls development only; concrete dam of gravity type, 4630 ft. long, develops normal head of 89 ft., creating a lake 14 mi. long; relocation of 16 mi. of railroad together with many State and Country roads and bridges required; unusual features of design and construction of dam and power station with general description of entire project.

I

INDUSTRIAL TRAINING

Skill. Does Mass Production Lessen the Need for Trade Skill? H. A. Frommelt. Am. Soc. Mech. Engrs.—advanced paper for mtg. Aug. 27–30, 1928, 2 pp. Need for trade training has increased both relatively and absolutely because of wholesale application of machinery and mass-production methods to modern industry; large numbers of craft-trained men are needed for supervisory personnel; mass production has been and is greatest single factor in increasing need and demand for skill.

INDUSTRIAL TRUCKS

Lift, Weighing. Handling and Weighing at Less Cost. Mfg. Industries, vol. 16, no. 2, June 1928, pp. 133–134, 1 fig. Link-Belt Co. adopts lift trucks equipped with dial reading scales, releasing four men from foundry labor.

INTERNAL-COMBUSTION ENGINES

High-Speed. Light High-Speed Internal-Combustion Engines, H. R. Ricardo. Automobile Engr. (Lond.), vol. 18, no. 243, July 1928, p. 263. Thermal efficiency, fuel requirements, weight, durability, and speed limitations of various types of internal-combustion engines are discussed; speed of engines limited by breathing capacity, dissipation of heat from connecting-rod big-end bearings, and mechanical operation of valves; reducing limitations. Abstract of paper presented to Instn. Civil Engrs.

Hult. A New Internal Combustion Engine, Automobile Engr. (Lond.), vol. 18, no. 243, July 1928, p. 264, 1 fig. Higher compression ratios obtained by artificial cooling in new engine invented by G. W. Hult; two working cylinders with compressor as part of same monobloc; during compression stroke water-cooled pipe, functioning as compression chamber, abstracts large part of compression heat; claimed that work of compression is less so that average pressure during both compression and expansion strokes is also less without mean effective pressure being diminished.

[See also AIRCRAFT ENGINES, DIESEL ENGINES, OIL ENGINES.]

IRON

Analysis. An Assumption as to the Cause of the Allotropic Changes of Iron, D. Jones. Am. Soc. Steel Treating—Trans., vol. 14, no. 2, Aug. 1928, pp. 199–210, 8 figs. Author attempts to show that changes occurring in iron when heated and cooled are due to changes in iron atom and suggests probable changes with their cause and mechanism; it is postulated that crystal structure and properties of other metals may be similarly connected with their atom structure.

Creep. Creep Tests as Made on Armco Iron, H. J. Tapsell. Heat Treating and Forging, vol. 14, no. 7, July 1928, pp. 746–750 and 756, 2 figs. Description of experiments on creep characteristics of metals at high temperatures, being made at National Physical Laboratory; conclusion that strain-hardened Armco iron may be further hardened by temperatures at least between 150 and 390 deg. cent., and both strain and temperature hardening occur during creep tests. Abstract of special report No. 6, Department of Scientific and Industrial Research, Eng. Research.

IRON AND STEEL

Testing. Creep in Ferrous Materials, H. J. Tapsell and W. J. Clenshaw. Iron and Steel Industry (Lond.), vol. 1, no. 5, Feb. 1928, pp. 164–165, 1 fig. Discussion of report on properties of materials at high temperatures, issued by Department of Scientific and Industrial Research; results of tensile, creep, torsion and hardness tests on Armco iron and 0.17 per cent carbon steel.

IRON MINES AND MINING

Electric Power. Use of Electric Power in Iron Mining, A. C. Butterworth. Am. Soc. Mech. Engrs.—advanced paper for meeting, Aug. 27 to 30, 1928, 3 pp. Development of electric power in Lake Superior district and its effect on ore output; possibilities of further applications; equipment for successful operations; electric power in under-ground mining; wasteful practice of old days; slushing hoists are great improvement; lighting and other uses; electric power in open-pit mining and future possibilities; necessary characteristics of equipment.

Mechanization. Mechanical Engineering in Iron-Ore Industry, A. Tancig. Am. Soc. Mech. Engrs.—advanced papers for meeting, Aug. 27–30, 1928, 4 pp. Modernization of mines on iron range of Minnesota, with their almost complete mechanization, credited to ability of profession in solving complex problems as operation developed; steam hoist of nineties; advent of steam shovel; mechanizing under-ground operations: pumping equipment of today; electric power shovel; types of ore-hauling cars; modernization without accident increase.

J

JIGS AND FIXTURES

Design. Jigs Designed for Use with Radial Drills, R. N. Piper. Am. Mach., vol. 69, no. 2, July 12, 1928, pp. 41–43, 8 figs. Jigs employed in drilling, boring and reaming heads of large radial-drilling machines; all drilling and most boring is done on similar machine.

Pins, Design. Work-Supporting Pins for Fixtures, A. M. Wasbauer. Machy. (N. Y.), vol. 34, no. 12, Aug. 1928, pp. 927–928, 3 figs. Adjustable or hand-set rest pins for supporting rough or uneven castings in fixtures are described.

L

LACQUERS

Nitrocellulose. Formulation of Nitrocellulose Lacquers, H. E. Hofmann and E. W. Reid. Indus. and Eng. Chem., vol. 20, no. 7, July 1928, pp. 687–693, 12 figs. It is purpose of this

paper to develop systematic method of lacquer formulation, based on use of experimental data scientifically obtained and represented graphically by means of triangular coordinate chart; attempt is made to show how properties of both volatile and non-volatile portions of lacquer may be studied, and their variation with changes in composition is recorded diagrammatically; it is also intended to indicate how these data and charts may be used to formulate new lacquers or to predict properties.

LATHES

Report on. Lathes. Am. Mach., vol. 69, no. 3, July 19, 1928, pp. 86–89, 16 figs. Semi-annual résumé of lathes described in shop equipment news section during first six months of 1928; details of engine, speed, turret, and special lathes are given, as well as attachments. For lathes in European edition see pp. 131–133.

LOCOMOTIVE BOILERS

Corrosion Prevention. Electro - Chemical Method for the Prevention of Locomotive Boiler Corrosion. West. Ry. Club—Proc., vol. 40, no. 7, Mar. 1928, pp. 12–48, 4 figs. Article clarifies function of chemical arsenic used in co-ordination with electric current; conception of process which has proved so successful in overcoming pitting and corrosion-electrochemical polarization system of corrosion prevention; system requires that current shall be supplied to electrodes at all times locomotive is in service.

LOCOMOTIVES

High-Pressure. High Steam Pressure and Condensing Exhaust for Locomotives, J. M. Taggart. Railroads (A.S.M.E. Trans.), vol. 50, no. 13, May-Aug. 1928, pp. 33–43 and (discussion) 43–49, 22 figs. Discussion of present progress; cycle efficiencies; auxiliary requirements; machine, transmission and thermal efficiencies; value of locomotives; possible turbine arrangements; tentative design of super-pressure locomotives.

High Steam Pressures in Locomotive Cylinders, L. H. Fry. Railroads (A.S.M.E. Trans.), vol. 50, no. 13, May-Aug., 1928, pp. 5–9 and (discussion) 9–12, 11 figs. In this paper author attempts extended survey of efficiencies obtainable with various steam pressures, and examines effect of ratio of expansion on efficiency; changes in boilers to permit operation at high pressures and temperatures are discussed; detailed computations and comparisons of theoretical indicator diagrams are made; it is not felt to be expedient to use boiler pressures much in excess of 450 lb. per sq. in. gage.

The Schmidt Double-Pressure Locomotive. Ry. Gaz. (Lond.), vol. 48, no. 25, June 22, 1928, pp. 848–849, 3 figs. Engine has three cylinders, special design of firebox, ordinary boiler and special boiler; ordinary 4–6–0 of standard class was utilized, fitted with special firebox and high-pressure supplementary boiler; boiler which generates steam at two pressures, one of 900 lb. and other of 200 lb.; high-pressure steam is used in single high-pressure cylinder, and, on exhausting, is mixed with low-pressure steam and admitted to two outside cylinders.

Maintenance. Locomotive Maintenance, C. F. Adams. Junior Instn. Engrs.—Jl. (Lond.), vol. 33, part 9, June 1928, pp. 425–447, 5 figs. Washing out of boilers; economical boiler-washing plant; engine cleaning; firelighting and preparing engine; running repairs to engine; hot axleboxes and crankpins; lubrication troubles; boiler repairs; superheater elements; heavy running repairs; repair shop.

Steam-Turbine. German Condensing Steam-Turbine Locomotive, F. W. Allport. Commerce Report, no. 29, July 16, 1928, pp. 148–149, 1 fig. Krupp Works, Berlin, have recently developed condensing steam-turbine locomotive along novel lines, incorporating many new elements; technical details of locomotive; turbines used are Zoelly type, supplied by Escher Wyss & Co., Zurich; normal capacity is 2000 b.hp. at speed of 6800 r.p.m.; operation of locomotive.

LUBRICATING OILS

Air Compressors. Essential Requirements of Air Compressor Oils. Lubrication, vol. 14, no. 5, May 1928, pp. 52–57, 7 figs. Relation of viscosity; flash and fire points; carbon deposits; methods of air-cylinder lubrication; type of compressor must be considered; effects of unsuitable oils; amount of oil required.

Steam Turbines. Chemist Tells Engineer About Turbine, H. L. Kauffman. Power Plant Eng., vol. 32, no. 14, July 15, 1928, pp. 762–764. Engineer should select proper oil for particular turbine and should then give attention to oiling system at regular intervals; characteristics of good turbine oil; how water gets into oil-circulating system; why does oil emulsify with water? what can be done to prevent trouble from emulsions? tests to determine when oil should be changed; determining state of oil by chemical methods; full records of oil and turbine performances are necessary to get best results from turbine oil.

LUBRICATION

Theories. Spreading of Lubricants on Solid Surfaces (De l'extension des lubricants sur les surfaces solides), P. Woog. Académie des Sciences—Comptes Rendus (Paris), vol. 186, no. 2, Jan. 9, 1928, pp. 71–73. Consideration of effect of very low temperatures, when all that is necessary is to choose oil which remains liquid when cold and at very high temperatures; it was shown that at 100 deg. cent. stearic acid reacts with steel, so that thin neutralizing layer no longer has properties of polarity and orientation which are necessary to prevent oil from spreading; other metals than steel have been experimented with and some non-metallic substances.

M

MACHINE SHOP

Equipment. Miscellaneous Equipment, Materials and Supplies. Am. Mach., vol. 69, no. 3, July 19, 1928, pp. 116–119, 17 figs. Semi-annual résumé of miscellaneous equipment, materials and supplies for machine shops described in shop equipment news section during first six months of 1928. For miscellaneous equipment in European edition see pp. 140–141.

Materials-Handling Equipment. Materials Handling Equipment. Am. Mach., vol. 69, no. 3, July 19, 1928, pp. 102–103, 5 figs. Semi-annual résumé of materials handling equipment described in shop equipment news section during first six months of 1928; details of tractor, lift trucks, hoist chain, and crane are given.

MACHINE TOOLS

Lubrication. Modern Methods of Lubrication. Machy. (Lond.), vol. 32, no. 819, June 21, 1928, pp. 369–370, 3 figs. General plan for organizing for proper lubrication of machine tools; capable man needed to attend to lubrication; reasons why machinery is not successfully lubricated by operators; examples of what has been accomplished by modern lubricating methods; lubricating large machines.

MACHINERY

Obsolescence. To Appraise Obsolescence of Machinery. Iron Age, vol. 122, no. 3, July 19, 1928, p. 165. Explanation of difference between obsolescence and depreciation given with object and plans for industrial-equipment survey to be undertaken by Department of Commerce under direction of H. C. Dunn; conditions affecting cost-accounting allowance for obsolescence factor in machinery to be studied.

Work Meters. Idleness and Output Recorders. Engineer (Lond.), vol. 146, no. 3785, July 27, 1928, pp. 97–99, 6 figs. Details of device known as "Pul-syn-etic" idle machine recorder, made by Gent & Co., Ltd., Faraday Works, Leicester; it fulfils duty of indicating when and for how long machine is idle; it does not, however, provide measure of output of machine, or whether it is working above or below its normal speed; to fulfil that duty, different but related device, the "Pul-syn-etic" output recorder is available.

MANGANESE STEEL

Properties. Medium Carbon Pearlitic Manganese Steels, J. Strauss. Am. Soc. Steel Treating—Trans., vol. 14, no. 1, July 1928, pp. 1–25 and (discussion) 25–26, 7 figs. Discussion of metallurgical and mechanical characteristics of steel of 0.30 to 0.50 per cent carbon and 1.00 to 2.00 per cent manganese; both wrought and cast forms are considered in both light and heavy sections; author points out similarity of these steels to other structural alloy combinations, limitations of heavy sections and of low tempering temperatures and advantages in respect to cutting qualities, resistance to corrosion, and strength at moderate temperatures. Bibliography.

METALS

X-Ray Analysis. Applied X-Rays in the Metal Industry, H. R. Isenburger. Metal Industry (N. Y.), vol. 26, no. 6, June 1928, pp. 271–272, 5 figs. Inspection of rough structure of metals by means of X-rays serves to discover slags, shrinkage, blowholes and like in unfinished, semi, and manufactured products; method is based upon capacity of X-rays to penetrate materials; most important practical application of X-rays in metal-working industry are enumerated.

MILLING MACHINES

Giant. Heavy Combined Portal Milling, Boring, and Drilling Machine. Machy. (Lond.), vol. 32, no. 821, July 5, 1928, pp. 440–443, 3 figs. Machining units designed by Schiess-Defries, A.-G. Dusseldorf, Germany, accomplish milling, drilling and boring operations at one setting; by use of large multi-tool cutter heads and powerful boring bars, heavy cuts with large feeds may be taken; machine-tool weight 500 tons; floor space, 11355 ft.; height 30 ft.; cross milling, boring, and drilling unit; transferable universal milling and drilling unit.

MOTOR TRUCKS

Springs and Suspension. Researches on Springs. Dept. of Sci. & Indus. Research, Eng. Research—Special Report no. 8, 1928 (Lond.), 42 pp., 32 figs. partly on supp. plates. Results of experiments with 30-cwt. and 60-cwt. army truck and with 2-seater high-speed automobile; National Physical Laboratory was asked to design mechanism which could be fitted to vehicle and which would give continuous record with time of displacements of springs relative to body of vehicle when run at different speeds and on different road surfaces; gives description of apparatus and results obtained.

MOTOR VEHICLES

Brakes. Are Two Entirely Separate Braking Systems Necessary? Operation and Maintenance, vol. 38, no. 1, July 5, 1928, p. 20. Question of whether it is desirable with four-wheel brakes, under present conditions, to require complete separation of service and parking brakes; recommendation made by Eastern Conference of Motor Vehicle Administrators, representing Eastern states and provinces; proposed brake law considered by other states.

N

NICKEL ALLOYS

Properties. Nickel, An Account of Its Alloys and Its Uses, A. C. Sturney. Min. Mag. (Lond.), vol. 38, no. 6, June 1928, pp. 341–347. Properties of nickel; commercially pure metal is generally brittle and non-malleable; small percentage magnesium renders it ductile, malleable, and amenable to fabrication, soldering, and welding by arc or acetylene; uses enumerated; nickel steels; ferronickel alloys of low thermal expansion and of high magnetic permeability; non-magnetic nickel iron; nickel cast iron; nickel-copper alloys; nickel-brass, bronze and aluminum bronze; heat-resistance alloys; nickel in aluminum.

NICKEL SILVER

Press Work. Press Work on Nickel Silver, A. L. Walker. Machy. (Lond.), vol. 32, no. 822, July 12, 1928, pp. 466–467. Composition of nickel-silver sheet commonly adopted for drawing and forming operations; nickel silver possesses to great extent property of work hardening; methods of avoiding overwork on nickel-silver parts; rules for forming and drawing nickel silver; press-tool design.

O

OIL ENGINES

Rating. Is a Uniform Rating Desirable for Oil Engines? P. H. Schweitzer. Power, vol. 68, no. 3, July 17, pp. 108–109, 1 fig. Absolute maximum horsepower that engine is capable of delivering is never used for rating; formula used for rating automobile engines in United States except California and England mostly for taxation purposes; standard rating of same general principle refers to tractors; fixing different m.e.p. ratings for various types of oil engines is not very promising.

OIL SHALE

Distillation, Low-Temperature. Manufacturing Oil from Oil Shale and Bituminous Coal, G. W. Wallace. Combustion, vol. 19, no. 1, July 1928, pp. 23–28, 4 figs. Description of Dundas-Howes process; low-temperature distillation of oil shale and bituminous coal; units in Santa Barbara County, Calif.; general arrangement of N-T-U Company's plant in California; capacity of plant is 200 tons per day; cost of operating plant.

OIL WELLS

Drilling, Rotary. The Eyes of the Driller.

Oil Bul., vol. 14, no. 6, June 1928, pp. 633-638, 5 figs. Device for purpose of indicating to operator what is happening in hole; "Drillometer," manufactured by Los Angeles company; pressure of bit on bottom is indicated by difference between weight of drilling string when bit is off bottom and weight shown while drilling; recording chart makes permanent record, as illustrated and described.

P

PACKING

Fibrous and Metallic. The Story of Packing, Fibrous and Metallic, C. J. Mason. South. Power Jl., vol. 49, no. 7, July 1928, pp. 58-63, 13 figs. Rod, stem and shaft metallic packing; requirements of metallic packing; principle involved; flexible ring type; metallic packing; for ammonia; France vanadium metallic packing; description of Cooke seal ring; choosing metallic packing.

PETROLEUM INDUSTRY

Equipment, Welding. Welding in the Oil Field, R. R. Robinson. Oil Field Eng., vol. 4, no. 1, July 1, 1928, pp. 17-22, 12 figs. Illustrates broad field for welding in drilling, production, and manufacturing fields of oil industry; primary requisites of drilling equipment are strength, reliability, and durability; personal factor is important in welding; manufacturers of welding equipment have assisted by education; many types of apparatus available; equipment for arc welding is more expensive than for acetylene, but for straight welding work is usually more economical in operation; welding of different items of equipment described.

Fire Prevention. Causes of Fire in the Petroleum Industry with Methods of Prevention, C. Dalley. Instn. Petroleum Technologists—Jl. (Lond.), vol. 14, no. 67, Apr. 1928, pp. 154-166 and (discussion) 166-173. First precautions are reduction of leakage to minimum, control of gas, and provision of high-grade fittings and plant; storage tanks; spontaneous combustion; static electricity; frictional sparks; lightning; foam solutions as extinguishers. Full text of paper previously annotated from abstracts.

PHOTOELECTRIC CELLS

Rubidium. Very Thin Films of Rubidium, A. L. Johnsrud. Bell Laboratories Rec., vol. 6, no. 5, July 1928, pp. 371-373. Describes relation between film thickness and photoelectric response; thickness of film to be measured as little as one atomic diameter one half of one millionth of millimeter.

PNEUMATIC TOOLS

Lubrication. Air Tool Lubrication. Lubrication, vol. 14, no. 5, May 1928, pp. 57-60, 6 figs. Lubrication under water conditions; abrasive material is detrimental; method of lubrication a factor; lubricating requirements; application of pneumatic-tool lubricants; air-line lubricators.

POWER GENERATION

Tropical Seas. Utilization of Thermal Power of Oceans (Sur l'utilisation de l'énergie thermique des mers), G. Claude and P. Boucherot. Académie des Sciences—Comptes Rendus (Paris), vol. 186, no. 23, June 4, 1928, pp. 1491-1495, 1 fig. Information on installation at Ougrée of plant built according to process developed by Claude and Boucherot; plan of installation and system of operation; gives results of test carried out on new plant, which show that in large installations, power available would be about three-quarters of total power supplied by turbines.

POWER PLANTS

Ash Handling. Development of Ash Handling Plant for Power Station Boilers, A. Powell. Indus. Mgmt. (Lond.), vol. 15, no. 7, July 1928, pp. 246-247, 249, 251 and 253, 2 figs. Data concerning various mechanical methods of disposing of boiler-house refuse, principally ashes; handling of ash by manual labor; suction ash-handling plant; soot disposal; drag-link conveyors; paddle type and sluicing type of ash conveyor; ash trough; dumping of ash direct into railway cars; capital and operating costs. Paper read before Junior Instn. Engrs.

Baltimore. Design Studies for Gould Street Generating Station, F. T. Leilich, C. L. Follmer and R. C. Dannettel. Am. Inst. Elec. Engrs.—advance paper, no. 49, for mtg. Apr. 17-19, 1928, 6 pp., 6 figs. This paper covers briefly various studies and investigations upon which design was based; number and size of steam generators; type of firing.

The Gould Street Generating Station of the Consolidated Gas, Electric Light and Power Company, A. S. Loizeaux. Am. Inst. Elec. Engrs.—advance paper, no. 48, for mtg. Apr. 17-19, 1928, 18 pp., 15 figs. Description of plant; one boiler is provided per turbine, each boiler delivering maximum of 520,000 lb. of steam per hour; automatic control provided for electric drive of boiler auxiliaries; actual costs are given for first unit, with estimated costs for completed plant, resulting in costs for completed plant of $88 per kw. for normal output.

Conowingo, Md. Electrical Features of the Conowingo Generating Station and the Receiving Substations at Philadelphia, R. A. Hentz. Am. Inst. Elec. Engrs.—advance paper no. 54 for mtg., Apr. 17-20, 1928, 10 pp., 16 figs. Paper outlines principal electrical features of development; includes description of main units and their connections, and outline of station auxiliary supply and 220,000-volt connections, and outline of station auxiliary supply and 220,000-volt substation which it was necessary to build on roof of power plant; description of 220,000-volt substation at Plymouth Meeting; and Westmoreland substation.

Low-Pressure Steam. Utilizing Low-Pressure Steam, W. B. Lewis. Power, vol. 68, no. 1, July 3, 1928, pp. 34-35. Author claims that power installations in industries using process steam should be based on industrial heat requirements and not on considerations of power-house efficiency; emphasizes following points: (1) temporarily forget mechanical power requirements and boiler plant and study uses of heat; (2) every operation requiring heat should be done with low-pressure steam wherever possible; (3) reduce amount of low-pressure steam through study of machines and processes, etc.

Pulverized Lignite. Pulverized Lignite Experiments At the University of North Dakota, R. L. Sutherland, N. T. Bourke and E. J. O'Keefe Power, vol. 67, no. 26, June 26, 1928, pp. 141-144, 5 figs. University has been conducting experiments with pulverized lignite for steam generation; late experiments have been carried on with unit of commercial size installed in University power plant; boiler used was Babcock & Wilcox type F-14 Stirling with 2400 sq. ft. of heating surface, set 6 ft. 11.5 in. above floor; furnace volume of 1140 cu. ft. and burner of fishtail type.

Reheat Cycle. Reheat Cycle Practice Not Yet Standardized. Power Plant Eng., vol. 32, no. 14, July 15, 1928, p. 775. No uniformity of reheating pressure temperature or practice is apparent from conditions reported by Nat. Elec. Light Assn.; tabulation of operating conditions at five stations using reheat cycle; no difficulty experienced with excessive superheat.

Tidal. The Bates Wave Power Plant. Australasian Elec. Times (Melbourne), vol. 7, no. 5, May 28, 1928, pp. 381-382. At Lurline Bay, Randwick, N. S. W., patent wave-power apparatus is installed, power of waves being used to pump water into air-tight receptacle or accumulator which equalizes variable force of waves and produces working pressure equaling head of about 100 ft.; steady flow from this accumulator was obtained which drove turbine and generator providing electricity for lighting and power.

PRESSES

Report on. Presses. Am. Mach., vol. 69, no. 3, July 19, 1928, pp. 90-92, 13 figs. Semi-annual résumé of presses described in shop equipment news section during first six months of 1928; details of inclinable, pneumatic, embossing, screw, and punch presses are given. For presses in European edition see pp. 135-136.

PRESSURE VESSELS

Welding. Design of Pressure Vessels for Petroleum Industry, T. McL. Jasper. Power, vol. 68, no. 4, July 24, 1928, pp. 164-167, 8 figs. Question of vessel design; strength of various steels at elevated operating temperatures; principal underlying tests described briefly; correct shape of head to develop full strength of cylinder of vessel; paper does not deal with question of theory except so far as it has been used to arrive at what might be considered best shape in design. Abridgment of paper presented before West. Refiners Assn.

PUMPS, CENTRIFUGAL

Efficiency. Methods of Computing Efficiencies of Centrifugal Pumping Machinery, J. L. Hunter. Hydraulic Eng., vol. 4, no. 7, July 1928, pp. 456 and 459. Summation of mathematics used in computing pump efficiencies, some steps of which are sometimes overlooked.

PUNCHING AND SHEARING MACHINES

Report on. Shearing and Punching Machines. Am. Mach., vol. 69, no. 3, July 1928, pp. 92-93, 7 figs. Semi-annual résumé of shearing and punching machines described in shop equipment news section during first six months of 1928; details of shearing, notching and combination machines are given.

R

RAILROADS

Water Supply. Use of Exchange Silicate (Zeolite) Water Softeners in Railroad Practice, G. L. Baxter. Indus. and Eng. Chem., vol. 20, no. 7, July 1928, pp. 755-758. Exchange silicate (zeolite) treatment at certain points on Southern Pacific Lines has been found less expensive than treatment with lime and soda ash and has resulted in more satisfactory operation of stationary and locomotive boilers.

RAILS, STEEL

Heat Treatment. Improvement of Rail Steel (Wege zur Verbesserung des Schienenbaustoffes), H. Viteaux. Stahl u. Eisen (Düsseldorf), vol. 48, no. 28, July 12, 1928, pp. 940-945, 11 figs. Author refers to article by O. Pilz, published in same journal, 1927, p. 1645, in which he deals with different methods of heat treatment of rails and increase of wear resistance; present author points to great improvement in resistance against widening of cracks, which has been accomplished by heat treatment at Neuves-Maison. includes reply by Pilz.

REFRIGERATION

Evaporating Systems. Evaporating Systems, T. Shipley. Ice and Refrig., vol. 75, no. 1, July 1928, pp. 57-65, 10 figs. Purpose of this paper is to make known data which have been compiled since Nov. 1926, from results which were obtained in operation of ice-making plants in which evaporating systems were based upon heat transformer of 75 B.t.u. per sq. ft. deg. per hr.; and also to call attention to further development of such apparatus. Paper read before Phila. Chapter of Nat. Assn. of Practical Refrig. Engrs.

RUBBER

Brittleness Testing. A Device for Measuring the Brittleness of Rubber and Gutta Percha Compounds, G. T. Kohman and R. L. Peek, Jr. Instruments, vol. 1, no. 6, June 1928, pp. 275-279, 2 figs. Description of apparatus and methods used to determine brittleness by bending of strip and determination of highest temperature at which strip fractures.

S

SHIP PROPELLERS

Anti Corrosive Steel. Noncorrosive Steel A New Material for Propellers. Pac. Mar. Rev., vol. 25, no. 8, Aug. 1928, pp. 378-380, 1 fig. Solid propellers have been cast of this steel up to 7500 lb. in weight; considers characteristics of several materials; cast iron; cast steel; Manganese bronze; use of anti-corrosive steel alloy in which is found material that will not itself corrode nor be party to corrosion in other portions of vessel.

SILK, ARTIFICIAL

Utilization, Woolens. The Use of Spun Rayon in Woolens, J. W. Cox, Jr. Black and White, vol. 1, no. 6, July 1928, pp. 3-8, 5 figs. Brief outline of development of spun rayon yarns, and two types of yarns most used for woolens, and woolen mixes, is given; two methods of manufacture; preparation and processes.

SPRINGS, HELICAL

Design. Springs from the Designer's Point of View, H. Barnes. Wire, vol. 3, no. 7, July 1928, pp. 227-228 and 244-246, 2 figs. Prejudice and lack of reliable data on performance records hinder wider application of coal springs; reliability of properly designed and heat-treated springs is established in variety of materials; new data for designers; springs properly classified as to duty with reference to "long-life factor."

STAINLESS STEEL

Chromium. Chromium Steels and Stainless Iron. Machy. (Lond.), vol. 32, no. 820, June 28, 1928, pp. 418-419. Properties conveyed by various amounts of chromium in steel and uses of such steels; chromium in steel is hardening agent but does not confer marked hardness in absence of carbon; as chromium content is raised steel becomes progressively stronger and

harder and loses ductility to some extent, and corrosion-resisting properties increase; properties of special class of stainless steel known as stainless iron made with carbon content not exceeding 0.1 per cent.

Welding. The Welding of Stainless Steel. Metal Industry (Lond.), vol. 32, no. 26, June 29, 1928, p. 640. From earliest days Alloy Welding Processes, Ltd., and its predecessors, confined themselves mainly to solving of problems surrounding welding of alloys of all kinds; it is nearly seven years since they succeeded in satisfactorily welding stainless steel and since that date stainless-steel electrodes which give entirely satisfactory results have been supplied by Company; kind of alloys required; progress made in England.

STEAM ENGINES

Extraction. Why Bled Steam for Processing and Heating Saves Fuel, C. H. S. Tupholme. Power, vol. 68, no. 2, July 10, 1928, pp. 52–55, 4 figs. This article shows in simple way the advantage of installing back pressure or extraction engines in plants requiring both power and steam for manufacturing and heating processes; economy of back-pressure engine.

Lubrication. Internal Lubrication of Stationary Steam Engines. Mech. World (Manchester), vol. 83, no. 2163, June 15, 1928, pp. 438–439, 5 figs. Object of internal lubrication in steam engine; considerations in selecting cylinder oil; methods of lubricant application; prevention of carbon deposits.

Marine (Beardmore-Caprotti). The Beardmore-Caprotti Marine Steam Engine. Shipbldr. (Newcastle), vol. 35, no. 215, July 1928, pp. 460–462, 5 figs. Main engine has cylinders 13½, 22, and 37 in., by 26 in. stroke designed for 100 r.p.m.; Beardmore-Caprotti valve gear is applied to all cylinders of main engine; coal per 1-hp-hr. 1.77 lb.

Marine (Lentz). The Lentz Unit Marine Engine, W. Salge. Shipbldr. (Newcastle), vol. 35, no. 215, July 1928, pp. 472–474, 4 figs. Compound engine operating under superheated steam, there being one high-pressure cylinder located between two low-pressure cylinders, each with independent steam and exhaust valves; improvements in design of Lentz engine have enhanced its value as economical prime mover; coal-consumption figures vary between 1.06 and 1.21 lb. results which are available for publication are given in table.

Testing. The Practical Value of the Report of the Heat Engine and Boiler Trials Committee, G. J. Wells. Inst. Marine Engrs.—Trans. (Lond.), vol. 40, June 1928, pp. 247–261, 11 figs. This report marks another important step in standardizing methods of conducting tests for determination of efficiency of heat engines; Heat Engines Committee have ascertained standards of comparison and framed codes by means of which all necessary measurements may be made; few remarks upon standards of comparison.

STEAM POWER, VOLCANIC

California. Natural Steam Power in California, E. T. Allen and A. L. Day. Nature (Lond.), vol. 122, no. 3062, July 7, 1928, pp. 17–18 and 27–28, 3 figs. Only development known that approaches achievement in Tuscany, Italy, has been carried out at The Geysers, 75 mi. north of San Francisco and about 30 mi. from Pacific coast; hot ground which has been actually explored covers area of only 35 acres; figures show that steam wells here are fully equal to those in Tuscany in point of power developed, and that they contain somewhat smaller percentage of fixed gases to diminish effectiveness of application of steam to power development.

STEAM TURBINES

Blades, Calculation. Detailed Numerical Calculation of Multiple-Action Blading (Calcul numérique détaillé d'un ailettage multiple a action), C. Colombi. Technique Moderne (Paris), vol. 20, no. 14, July 15, 1928, pp. 473–483, 10 figs. This article treats of some examples of application of method of calculation given in preceding article; it establishes for different forms of construction all elements of multiple-action blading and shows how to make exact calculations rapidly.

Design. The General Trend of Modern Development in Steam-Turbine Practice, H. L. Guy. Iron and Coal Trades Rev. (Lond.), vol. 116, no. 3146, June 15, 1928, pp. 904–905; and Engineer (Lond.), vol. 145, no. 3780, June 22, 1928, pp. 678–679. Tendency towards higher steam pressures; thermal advantages; steps in thermal efficiency; little tendency towards standardization in capacity; cost of developing particular size unit is considerable; multiplication of such charges represents serious loss. Paper read before Instn. Civil Engrs.

Development. Development of the Steam Prime Mover, D. O. Woodbury. Elec. Light and Power, vol. 6, no. 8, Aug. 1928, pp. 22–25 and 107–109, 7 figs. Experimental machines built by Curtis; first Curtis turbine built commercially by General Electric Company; story of prime mover is identical with history of turbine; early improvement was use of only one row of buckets per wheel; special interest is mercury-vapor process invented by W. L. R. Emmet.

SUPERHEATERS

Steam Dissociation. Dissociation of Steam in Superheaters. Power Plant Eng., vol. 32, no. 13, July 1, 1928, pp. 737–738, 1 fig. Because of lack of definite information and existence of conflicting theories, N.E.L.A. recently canvassed their entire membership for information; reports of tests to determine moisture content of steam, show that determination of proper size and location of orifice offers most serious difficulty in this connection; although results vary considerably, attention is called to fact that moisture is indicated in every case and in considerable quantity.

T

TEXTILE MILLS

Management. Increasing the Production of Cotton Padders, R. Longfield. Am. Soc. Mech. Engrs.—Advance paper for mtg., May 22, 1928, 6 pp., 4 figs. Practical example showing certain conditions in one of departments of cotton-goods bleachery, how problem was approached and worked out, and results obtained; conditions as found; analysis of delays; developing plans; installation; wage incentive; eliminating excess men; brief survey of records in order to determine, by comparing data obtained prior to change with that of new organization if results have come up to expectations.

TIME STUDY

Allowances. Computation of Allowances, N. E. Stearns. Taylor Soc.—Bul., vol. 13, no. 3, June 1928, pp. 148–152. These questions immediately arise: what are allowances in time-study work, what are their functions, and of what value are they; incidental and standard allowances; personal allowance factor; fatigue factor; profit factor; flexibility factor.

Applications. The Application of Time Study to Office Workers Both Clerical and Machine, W. H. Leffingwell. Taylor Soc.—Bul., vol. 13, no. 3, June 1928, pp. 157–163, 1 fig. Author has developed and extensively used form of measurement by which he is enabled to very quickly determine relative efficiency of an office organization, amount of time that is occupied on each of operations in routine, etc.; importance of breaking down every management problem into its elements before beginning precise measurement involved in time study; what is needed is handbook on speed with which work can be done, similar to ordinary engineering handbooks.

The Application of Time Study to Shop Operations, L. W. Haskell. Taylor Soc.—Bul., vol. 13, no. 3, June 1928, pp. 155–157. Time study procedures developed in past 35 years, are all good that have dual purpose of eliminating waste and increasing material welfare of people; making of time studies today calls for time-study engineer; qualifications in picking such a man. Paper presented at joint meeting of Taylor Soc. and Nat. Retail Dry Goods Assn.

Operation. The Number of Workers to Be Observed, S. B. Sponder. Taylor Soc.—Bul., vol. 13, no. 3, June 1928, pp. 138–141. Factors which are discussed are general in character and applicable to practically all industrial operations; elaboration of each of these factors; attempts to point out that time-study engineer should develop point of view, or philosophy.

Use of Data. Classification, Filing, and Use of Time-Study Data, S. M. Lowry. Taylor Soc.—Bul., vol. 13, no. 3, June 1928, pp. 118–121 and (discussion) 121–125, 11 figs. Author assumes that time study has been made according to approved scientific method and that elemental values secured are correct; file should be maintained so that individual time studies may be readily found for reference purposes; various methods of filing time studies; example showing how operation times would be computed in case of concern manufacturing gears to order.

TOOL STEEL

Alloying Elements. Tool Steels. Black and White, vol. 1, no. 3, Mar. 1928, pp. 22, 27–31. General effect of alloying elements; nickel; nickel steels with nickel contents under 1 per cent; chromium; action of chromium in steel; vanadium; tungsten; molybdenum; manganese; silicon used in practically all commercial steels as deoxidizer.

TOOLS

Bending and Forming. Bending and Forming Tools, W. Richards. Mech. World (Manchester), vol. 83, no. 2164, June 22, 1928, pp. 450–451, 2 figs. Shearing and forming operation upon blanked component described in connection with manufacture of typewriter key lever.

Grinding. Grinding Roll Turning Tools, R. H. Cannon. Iron Trades Rev., vol. 83, no. 2, July 19, 1928, pp. 135 and 137, 3 figs. Grinding of roll-turning tools for steel mills explained with details of wheels and special machine developed for purpose.

TUBES, STEEL

Manufacture. The Manufacture of Steel Tubes (Die Herstellung von Stahlrohren), E. Roeber. Stahl und Eisen (Duesseldorf), vol. 48, no. 33, Aug. 16, 1928, pp. 1113–1120, 26 figs. Review and description of different processes for manufacture of steel tubes; tube dimensions according to the different processes; comparison of processes.

W

WALLS

Heat Transmission, Research. Heat Transmission Research, F. B. Rowey, F. M. Morris, and A. B. Algren. Am. Soc. Heat. and Vent. Engrs.—Jl., vol. 34, no. 7, July 1928, pp. 517–541, 23 figs. Results of cooperative research between University of Minn. and Am. Soc. of Heating and Ventilating Engrs.; flow of heat through building and insulating materials; experiments have been directed to development of apparatus and testing of built-up wall sections and insulating materials; description of test apparatus; hot-plate apparatus and tests; calibrations of apparatus.

WELDING

Bibliography. Current Welding Literature. Am. Welding Soc. —Jl., vol. 7, no. 6, June 1928, pp. 61–63. Bibliography covering American and foreign periodicals.

WIND TUNNELS

Air Flow. On Improvement of Air Flow in Wind Tunnels, C. Wieselsberger. Nat. Advisory Committee for Aeronautics—Tech. Memo., no. 470, July 1928, 9 pp., 7 figs. Analysis of Gottingen type of wind tunnel; application of Gottingen principle to other wind tunnels, such as Nat. Physics Laboratory or Eiffel type, by replacing customary exit cone with different one; requirements of air stream employed in aerodynamic investigations of aircraft models or of individual parts. From Jl. of Soc. Mech. Engrs. of Japan, vol. 28, no. 98, June 1925.

WINDOWS, METAL

Air Infiltration. Air Leakage Through a Pivoted Metal Window, F. C. Houghten and M. E. O'Connell. Am. Soc. Heat. and Vent. Engrs.—Jl., vol. 34, no. 7, July 1928 pp. 549–553, 5 figs. Study of air leakage through pivoted window in Grand Central Palace Bldg., New York City, during Power Show; description of building; test procedure and results.

WIRE

Testing Machines. The Mechanical Testing of Wire, J. D. Brunton. Wire, vol. 3, no. 7, July 1928, pp. 224–226 and 241–244, 6 figs. Variety of machines makes it possible to maintain high-quality production by frequent, rapid and accurate tests; gives outline of these tests and their meaning and describes apparatus that is most commonly used to perform them; 10,000-lb. capacity; 60,000-lb. capacity; 200-lb. machines; testing grips important.

Z

ZINC PLATING

Galvanic. Electroplating Zinc. Metal Industry (Lond.), vol. 32, no. 25, June 22, 1928, p. 620. Paweck and Seiboer, of Vienna Electrochemical Institute, have devised galvanic zinc-plating process, which greatly reduces time factors in that operation.

THE ENGINEERING INDEX

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Mechanical Engineering Section

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AIR COMPRESSORS

Rotary and Turbo. Rotary and Turbo Compressors. Engineer (Lond.), vol. 146, nos. 3789 and 3790, Aug. 24 and 31, 1928, pp. 206–208 and 233–234, 15 figs. Aug. 24: Types of rotary compressors which operate on displacement theory; cooling; fundamental principle of turbo-compressor is that of centrifugal pump and form of impeller is virtually that of single eye type of pump. Aug. 31: Cooling and regulation of turbo-compressor; blow-off valves; constant-volume control for turbo-blowers; special types for blast-furnace work.

AIR CONDITIONING

Refrigeration in. Refrigeration as Applied to Industrial Air Conditioning, R. W. Waterfill. Heat. and Vent. Mag., vol. 25, no. 9, Sept. 1928, pp. 75–78, 5 figs. Purpose of this paper is to point out developments in progress for adaptation of refrigeration, as formerly applied to ice making to more recently developed field of dehumidifying and air conditioning compares characteristics of many developments available; refrigerating requirements of air conditioning; refrigerating mediums; refrigerating mechanisms; new development in absorption media; automatic regulation with centrifugal compressor.

AIRCRAFT ENGINES

Air Cooling of. Air Cooling of Aircraft Engines (Luftkuehlung bei Flugmotoren), F. Gosslau. V.D.I. Zeit (Berlin), vol. 72, no. 38, Sept. 22, 1928, pp. 1335–1340, 26 figs. Paper read at 1928 annual meeting of Society of German Engineers (V.D.I.), reporting experiments made at Siemens and Halske laboratories; obtained quantitative relationship between wind velocity, cylinder-wall temperature, and construction type and dimensions of cylinders, aiding in design of air-cooling system for engines; critical review of various types of cylinder construction.

Cylinders—Nitridation. Nitralloy—A New Steel. Aero Digest, vol. 13, no. 3, Sept. 1928, pp. 458 and 460. Manufacturing process developed by L. Gullet, employed for making aircraft-engine cylinders of nitrided steel is described; hardness of nitrided special steels can produce very remarkable polish which changes entirely friction conditions. Process was described before French Academy of Sciences.

Oil. Oil Engines for Aircraft and Railways, A. E. L. Chorlton. Engineering (Lond.), vol. 126, no. 3271, Sept. 21, 1928, pp. 375–378 and (discussion) 369, 10 figs. Review of what has been accomplished in this field; main attraction of oil engine for aeronautical purposes is its safety; problems of successful design of quick-running oil engines are principally concerned with injection and combustion of fuel. Paper read before Brit. Assn.

AIRCRAFT PROPELLERS

Efficiency. Considerations on Propeller Efficiency, A Betz. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 481, Sept. 1928, 20 pp., 12 figs. Mention is made of difficulties encountered in defining propeller efficiency when propeller is affected by mutual interference with vehicle and especially with wing; different ways of overcoming these difficulties to some degree, at least for practical requirements, are indicated, but none of these ways is found to be entirely satisfactory. Translated from Zeit. fuer Flugtechnik u. Motorluftschiffahrt. Apr. 28, 1928.

AIRFOILS

Lift Curves. Preliminary Report on the Flat-Top Lift Curve as a Factor in Control at Low Speed, M. Knight and M. J. Bamber. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 297, Sept. 1928, 10 pp., 5 figs. Importance of flat-top lift curve as contributing to safety and control at low speed; analysis of existing airfoil data indicated definite relation between shape of lift curve and certain section dimensions; airfoil with this lift curve has reduced tendency to spin; owing to high moment coefficient and low aerodynamic efficiency, N.A.C.A. 84 section is not considered satisfacory.

AIRPLANES

Biplanes, Lift Calculation. On the Lift of Biplanes, T. Moriya. Tokyo Imperial University—Jl. (Tokyo), vol. 17, no. 10, Aug. 1928, pp. 191–200, 12 figs. Amount of interference on lift of staggered biplanes is computed by Munk's theory, considering motion of air to be two-dimensional; using Prandtl's theoretical correction, simple and accurate method of prediction of biplane lift from monoplane experiments has been developed; comparison between some biplane experimental curves and corrected ones from monoplane experiments. (In English.)

Frames, Design of. Design of Three-Dimensional Lattice Systems of Airplane Frames (Ueber raeumliche Flugzeugfachwerke-Die Laengsstabkraftmethode), H. Wagner. Zeit. fuer Flugtechnik und Motorluftschiffahrt (Muenchen), vol. 19, no. 15, Aug. 14, 1928, pp. 337–347, 17 figs. Methods of design of statically determinate and statically indeterminate three-dimensional lattice work for frames of various types with straight and buckled cross beams.

Giant, Design of. The Cells of Giant Airplanes, E. Offermann. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 478, Sept. 1928, 16 pp., 4 figs. Factors to be considered in increasing size of airplanes; enlarging is probably limited by fact that empty weight increases disproportionately with enlargement; views of Lanchester and Everling are taken up; in Rohrbach enlargement method no geometric enlargement can properly be assumed, and due to increased wing loading, wing area does not increase in proportion to full load. From Offermann's "Riesenflugzeuge" (1927) pp. 184–193.

Maneuverability. The Span as a Fundamental Factor in Airplane Design, G. Lachmann. Nat. Advisory Committee for Aeronautics—Tech. Memorandum, no. 479, Sept. 1928, 40 pp., 21 figs. Effect of span on climbing ability of biplanes; study of maneuverability of airplane of great importance for judging combat, sport, and stunt-flying planes; for given wing area monoplane is inferior to biplane as regards maneuverability; speed of rotation is reduced by "good" aspect ratio; airplane with smallest span requires shortest time to accomplish complete turn of 180 deg. Bibliography. Translated from Zeit. fuer Flugtechnik u. Motorluftschiffahrt, May 14, 1928.

Metal, Manufacture of. Problems of Metal Construction. Soc. Automotive Engrs.—Jl., vol. 23, no. 4, Oct. 1928, pp. 342–344. Review of Production Session of Los Angeles meeting with brief abstracts of paper; corrosion of aluminum alloys greatest difficulty; determinate materials, indeterminate forms favored; maintenance of duralumin for Naval aircraft structure discussed by L. B. Richardson; plane should be designed to avoid corrosion; all-duralumin airplane as now constructed in United States is quite unsuitable for seaplane service; H. V. Thaden set forth developments in and his idea of metal construction.

Sesquiplane (Gates-Day). The New Standard, L. E. Neville. Aviation, vol. 25, no. 12, Sept. 15, 1928, pp. 864–865, 892, 894, 896 and 898, 9 figs. Five-passenger open-cockpit sesquiplane powered with 180-hp. Wright Hispano engine; wing span 45 ft.; maximum speed 115

NOTE.—The abbreviations used in indexing are as follows:
Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

m.p.h. plane characterized by its large gap, great stagger and tapered wings; fuselage entirely of heat-treated duralumin members of standard section riveted or bolted together; V-type landing gear has 8-ft. tread; wood wings.

Stall Proof. The Merrill Airplane. Science, vol. 68, no. 1760, Sept. 21, 1928 (Supp.) p.x. Details of new airplane which differs radically from previous models and completely eliminates possibility of stalling; product of newly organized Daniel Guggenheim School of Aeronautics at California Inst. of Technology; short stubby tail, no stabilizer but large vertical rudder; angle, of wings with fuselage controlled by pilot; shorter landing space.

ALLOYS

Heat-Resisting. Heat Resisting Alloys, T. H. Turner. *Am. Metal Market, vol. 35, no. 179, Sept. 18, 1928, pp. 12–14, 4 figs. Heat-resisting alloys used in connection with electricity; in internal-combustion engines, in guns and rifles for hot forging dies, and in chemical industries. Paper read before Inst. of Metals.

[See also ALUMINUM ALLOYS; ALUMINUM BRASS; BEARING METALS; COPPER ALLOYS.]

ALUMINUM ALLOYS

Castings, Testing of. Stability of Aluminum and Magnesium Casting Alloys, A. J. Lyon. Am. Inst. Min. and Met. Engrs.—Tech. Publication, no. 133, Sept. 1928, 15 pp., 5 figs. Test specimens cast in green sand and ordinary foundry practice observed; chemical composition determined on original melts; aluminum-copper alloys; aluminum-copper-magnesium; aluminum-copper-nickel-magnesium; aluminum-silicon; aluminum-zinc; magnesium-aluminum-manganese; magnesium-zinc-aluminum.

Elastic Limit. The Elastic Limit and Figure of Merit of Light Alloys (Guetezahlen und Elastizitaetsgrenzen bei Leichtmetallen), A. Schroeder. Zeit, fuer Flugtechnik u. Motorluftschiffahrt (Munich), vol. 19, no. 5, Mar. 14, 1928, pp. 105–106. Custom of comparing performance of light alloys on basis of saving in weight for same tensil strength is fallacious, since no consideration for safety is given; what is required is not comparison of ultimate tensile but infinite life under reversal of stress; point is closely related with elastic limit of material. Elastic limit has to be determined with great accuracy in order to render comparison of value.

Hyb-Lum. Hyb-Lum Aluminum Alloy. Aero Digest, vol. 13, no. 3, Sept. 1928, pp. 444 and 446. Properties, composition, and applications of new product of Sheet Aluminum Corp.; among qualities claimed are color, non-tarnishing non-corrodibility, resistance to intercrystalline, corrosion, chemical resistivity, welding quality, strength and plasticity, non-fatigue, low specific gravity, wide limits of temperature in heat treatment, and stability after heat treatment even at elevated temperatures.

Properties. Aluminum Alloys (Ueber Aluminium-Legierungen), A. Merz. Giesserei (Duesseldorf), vol. 15, no. 34, Aug. 24, 1928, pp. 836–840, 3 figs. Properties and improvement of best known aluminum alloys are discussed, including duralumin, aldur, skleron, aeron, konstruktal, montegal, lautal, silumin, alneon and neonalium.

ALUMINUM BRASS

Properties. Aluminum Brasses, E. R. Thews. Can. Chem. and Met. (Toronto), vol. 12, no. 9, Sept. 1928, pp. 246–248. Discussion of metallurgical properties which have a bearing on difficulties met with frequently in manufacturing practice; aluminum and hot rolling of brass; metallurgical considerations; applications of aluminum brasses.

AMMONIA COMPRESSORS.

Large. The largest Refrigerating Compressor in the World (Der groesste Kaeltekompressor der Welt). Eis- u. Kaelte-Industrie (Berlin), vol. 21, no. 8, Aug. 1928, pp. 86–88, 2 figs. Descriptive note on 4,000,000-calories two-stage ammonia compressor manufactured by Gebrueder Sulzer A.-G. of Winterthur, Switzerland, for German chemical plant; compressor is direct-connected with 1200 hp. steam engine; vaporization temperature is minus 5 deg. cent., liquefaction temperature is plus 30 deg. cent.

AUTOMOBILE ENGINES

Crankshafts, Manufacture of. Continental Crankshaft Practice, C. O. Herb. Machy. (N.Y.), vol. 35, no. 2, Oct. 1928, pp. 103–109, 19 figs. Methods recently adopted by Continental Motors Corp. for making crankshaft of well-known 6-cylinder automobile; accuracy required of crankshafts; turning bearings and facing crankarms; milling to length; finish-turning crankshaft bearings; turning crankpins; finishing contour, chamfering, and filing crankarms; rough-grinding crankpins and drilling oil holes; finish-grinding bearings and pins; turret lathe and internal-grinder operations; final operations which insure accuracy.

Design. How Motion of a Mechanism May Be Analyzed Geometrically, W. Samuels. Automotive Industries, vol. 59, nos. 11 and 12, Sept. 15 and 22, 1928, pp. 366–369 and 406–408 and 417, 3 figs. Sept. 15: Method by which motion of mechanism can be analyzed completely from its geometry, and automotive applications given; differential calculus involved is explained to make method accessible to every engineer; distances, angles, times, and speeds dealt with; application to driven end of crank train. Sept. 22: Application to engine valve cams; cam with outline composed of circular arcs, and contacting with flat plate on rocker arm; value of sliding reduction.

Ignition, Testing of. The Effect of Hydrocarbon Vapor on the Contact-Points of Ignition Apparatus, E. A. Watson. Automobile Engr. (Lond.), vol. 18, no. 245, Sept. 1928, pp. 347–350. Investigation of conditions under which sparking at contacts occurred is described; theory of contact-breaker operation; tests of platinum and tungsten contacts in hydrocarbon vapors; conclusion reached from these tests was that, although wear of tungsten contacts would be somewhat accelerated by presence of hydrocarbon vapor, there was no risk of catastrophic destruction which occurs with platinum.

Machining. Reo Crankshaft Machining Methods Include Final Hone Dressing, K. W. Stillman. Automotive Industries, vol. 59, no. 11 and 12, Sept. 15 and 22, 1928, pp. 374–376 and 410–412, 12 figs. Sept. 15: Production methods in plant of Reo Motor Car Co. for obtaining accuracy in engine and chassis; crankshaft machining operation removes roughness and permits heavy-duty service as soon as assembled; crankshaft production program described. Sept. 22: Machining operations carried out on cylinder block at company's Lansing plant; casting sprayed with gray lacquer before passing to machine line; bottom is milled first for locating surface.

Pistons, Invar Strut. Mathematical Theory of Invar-Strut Piston Is Explained, P. M. Heldt. Automotive Industries, vol. 59, no. 12, Sept. 22, 1928, pp. 420–421, 5 figs. Nelson patent shows method of determining proper strut size for any particular coefficient of heat expansion to obtain given overall expansion for certain temperature increase; when strut material with low coefficient of expansion is used, resultant normal to skirt wall is materially decreased while tangential resultant is greatly increased.

AUTOMOBILE PLANTS

Materials Handling in. Minimizing Manual Operations in Handling Materials, F. W. Curtis. Am. Mach., vol. 69, no. 12, Sept. 20, 1928, pp. 449–452, 8 figs. Materials-handling equipment at Pontiac Division of Oakland Motor Car Co. is described; tendency is to eliminate use of trucks in interdepartmental work by substituting gravity-roller or overhead power-driven conveyors; advantage in power conveyor is reduction of losses due to damage in handling.

AUTOMOBILES

Gears and Gearing, Manufacture of. Gear Blanks With Minimum Waste, C. A. McGroder. Iron Age, vol. 122, no. 14, Oct. 4, 1928, pp. 815–817, 5 figs. Uniformity of grain structure where it is most needed and minimized waste of material are outstanding improvements effected by new method of manufacturing bevel ring gear blanks, as developed and perfected by forge department of Dodge Brothers Corp., Detroit; using 4 1/2-in. chrome-vanadium steel bar stock, this new process, through novel heading operation, turns outside surface of bar out and away from its center, until it lies at right angles to original bar.

Inspection. Inspection Methods and Their Application, F. H. Colvin. Am. Mach., vol. 69, no. 11 and 12, Sept. 13 and 20, 1928, pp. 427–430 and 461–463, 16 figs. Sept. 13: Gages and fixtures for testing crankcases in rough and after all of machining operations have been completed; Franklin, Yellow Sleeve-Valve, and Marmon practice is described. Sept. 20: Methods of checking center distances for timing gears; gages and tools for inspecting and squaring surfaces for attaching bell housings for transmissions; Pierce-Arrow, Yellow Sleeve-Valve and Nash practice is given.

Parts, Heat Treatment of. Willys-Overland Heat-Treating Methods, F. W. Manker. Machy. (N. Y.), vol. 35, no. 2, Oct. 1928, pp. 131–133, 5 figs. Normalizing, hardening, and tempering operations performed by automatically carrying work through furnace arranged in tandem; hardening and tempering crankshafts; heat treating miscellaneous parts; three furnaces used in heat treating rear-axle shafts; annealing operations performed in pusher-type furnaces.

Rocket. Rocket Automobiles, Experiments and Prospects (Versuche und die Aussichten des Raketenwagens), M. Valier. Technische Blaetter (Duesseldorf), vol. 18, no. 38, Sept. 23, 1928, pp. 561–564, 5 figs. Author describes features of his design of rocket automobile, main differences between his and Opel's design; reports experiments with car of his design, manufactured by J. P. Eisfeld Powder and Pyrotechnic Works, at Silberhuette, in which velocities as high as 180 km. per hr. were attained in two seconds; claims rocket engines can be made thermally more efficient than internal-combustion engines; foresees unthought-of speed and interplanetary communication.

Shock Absorbers. Triple-Hydraulic Shock Absorber Introduced by Gabriel. Automotive Industries, vol. 59, no. 11, Sept. 15, 1928, p. 384, 2 figs. Details of automobile shock absorber made by Gabriel Snubber Co., Cleveland, new device is of double-acting type, controlling both up and down-spring movement; patented multiple vane which distributes shocks through three points.

Transmissions, Design of. Gear Box Design. Motor Transport (Lond.), vol. 47, no. 1224, Aug. 27, 1928, p. 254, 1 fig. Design of gear box introduced by J. M. Hargreaves is discussed; three forward speeds and reverse; gears are in constant mesh; speed changes affected by four cone clutches.

Transmission, Heat Treatment of. Precision Heat Treatment for Gears. Iron Age, vol. 122, no. 13, Sept. 27, 1928, pp. 761–764, 4 figs. Heat-treating operations on automobile transmission and ring gears at plant of Dodge Bros., six-zone annealing, controlled to 7 deg., necessary for maximum machinability; oil for quenching presses held to 3 deg., plus or minus.

AUTOMOTIVE FUELS

Combustion. Combustion in Automobile Engines (Die Verbrenning im Kraftwagenmotor, ihre Gefahren und ihre Unwirtschaftlichkeit), Sass. Automobil-Rundschau (Berlin), vol. 30, nos. 12 and 14, June 15 and July 15, 1928, pp. 285–289 and 368–370, 16 figs. Author goes thoroughly into mechanism of combustion, giving probable steps of combustion in form of chemical formulas; he deals fully both with poisonous character of combustion gases and with heat losses accruing; it is estimated that in general 50 per cent of heat in fuel is needlessly wasted.

Detonation. Anti-Detonants, C. Moureau and C. Dufraisse. Automobile Engr. (Lond.), vol. 18, no. 245, Sept. 1928, p. 320. Discussion of theory that action of chemical anti-knock compounds is basically anti-oxygenic; domain of traces of prooxidant, or other impurity is enormous, and no doubt most light thereon will come from precise data concerning physico-chemical structure of molecules; formation of explosion wave explains in satisfactory manner phenomena observed when engine knocks. From Chem. and Industry, vol. 47, no. 33, p. 848.

Anti-Knock Fuels, G. Edgar. Chem. and Industry (Lond.), vol. 47, no. 34, Aug. 24, 1928, pp. 230T–232T. Brief summary of more important relationships of knock to efficiency of internal-combustion engine; nature of knock; theoretical aspects; knocking characteristics of various fuels; use of anti-knocks; methods of measuring knock characteristics; tendencies in automotive engine design and in fuel production.

Flame Characteristics. Some Flame Characteristics of Motor Fuels, G. B. Maxwell and R. V. Wheeler. Indus. and Eng. Chem., vol. 20, no. 10, Oct. 1928, pp. 1041–1044, 6 figs. In order to obtain some information as to cause of "pink" or knock of motors fuels, photographic study has been made of movement of flames, simultaneously with measurements of development of pressure, during explosion of charge in engine cylinder; suggestions are made for suppression of pinking, and on basis of these studies differences between pinking and non-pinking explosions are pointed out.

Gas. Replacing Liquid Motor Fuel with Gas Fuel, F. Lommatsch. Petroleum Times (Lond.), vol. 20, no. 501, Aug. 18, 1928, p. 280. Discusses lighter-than-air flying craft; in United States military airships, loss of weight by consumption of fuel is compensated by passing gases through condenser; latest Zeppelin LZ 127 to be tested in Aug. 1928, with gas fuel; is of about same specific gravity as air; its consumption does not change weight of airship; said to increase action radius 30 per cent. Abstract translated from Allgem. Oesterr. Chem. u. Tech. Zeit.

Testing. The Influence of Fuel Characteristics on Engine Acceleration, D. B. Brooks. Soc. Automotive Engrs.—Jl., vol. 23, no. 3, Sept. 1928, pp. 235–248 and discussion 248, 38 figs. Method for approximately deriving effective air-fuel ratio delivered to cylinders during acceleration described; effect of fuel volatility on engine acceleration was studied using six fuels; it is

shown that relative values of these fuels for acceleration depend upon amount of vaporization in manifold.

B

BALANCING

Methods of. Static and Dynamic Methods of Balancing (Statische und dynamische Auswuchtung), D. Hofmann, Maschinenbau (Berlin), vol. 17, no. 7, Sept. 6, 1928, pp. 814–817, 11 figs. Description of Hofmann-Kunze dynamic method of balancing, also of "Universal," "Punga" and other balancing machines; vibration-measuring instruments.

BEARING METALS

Tin-Base. A Study of Tin-Base Bearing Metals, O. W. Ellis and G. B. Karelitz. Machine-Shop Practice (A.S.M.E. Trans.), vol. 50, no. 18, May-Aug. 1928, pp. 13–27 and (discussion) 27–28, 64 figs. First part of investigation of babbitts; results of metallographic and mechanical tests on series of tin-antimony-copper alloys containing up to 10 per cent of antimony and 8 per cent of copper; relationships between composition, microstructure, hardness, and compressive strength of these alloys; influences of elevated temperatures and of lead upon these properties.

BEARINGS

Lubrication. A Theory of the Lubrication of Cylindrical Bearings, F. E. Cardullo. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Sept. 24–27, 1928, 14 pp., 6 figs. on supp. sheet. Author enumerates characteristic which lubricants must possess, explains effects of viscosity, and develops mathematical theory on design and operation of bearings.

Grooving Bearings in Machines, G. B. Karelitz. Am. Soc. Mech. Engrs.—Advance Paper, for mtg. Sept. 24–27, 1928, 9 pp., 30 figs. on supp. sheet. Essentials of correct lubrication and conditions which it is desirable to establish by means of grooving are discussed; series of examples of grooving in classified number of applications; mechanism of lubrication briefly discussed, author concludes that large number of machine-bearing troubles would be eliminated and wear would be decreased, were more attention paid to fundamentals of lubrication during design of machines.

The Friction of Journal Bearings With Insufficient Lubrication (Die Reibungsverhaeltnisse des Gleitlagers bei unvolkommener Schmierung), W. Koehler. Archiv fuer das Eisenhuettenwesen (Duesseldorf), vol. 2, no. 3, Sept. 1928, pp. 159–168, 25 figs. Author discusses friction conditions of bearings with and without adequate lubrication; calculation of heat balance; predetermination of corresponding values for experimental bearing of Dettmar oil-testing machine; method and equipment for determination of coefficient of friction of journal bearing; friction of white-metal bearing with adequate and inadequate lubrication.

BELT DRIVE

Problems. Solutions of Some Difficult Belt Drives, J. E. Rhoads. Power, vol. 68, no. 23, Sept. 25, 1928, pp. 527–528, 2 figs. Solutions of six typical cases of problems of belt drives; in case of valuable machine which may become jammed, serious breakage may be saved through presence of belt which can slip, fly off pulley, or break in such emergency; case of mixing machine in chemical industry; group drive direct from compound engine to shaft driving 16 beaters in paper mill; 200-gal. per mi. portable pump in tannery; centrifugal oil-clarifying machine; etc.

BLAST FURNACES

Process, Theory of. A New Theory of the Blast-Furnace Process (Eine neue Theorie des Hochofenverfahrens), F. Wuest. Stahl und Eisen (Duesseldorf), vol. 48, no. 37, Sept. 13, 1928, pp. 1273–1287, 12 figs. Review of earlier research on oxidation zone in front of tuyeres and formation of pig iron in furnace; impossibility of reduction of silicon and manganese from slag; reduction of auxiliary elements by carbon obtained from carbon monoxide in shaft and bosh; confirmation of this theory by laboratory tests; injurious effect of oxidation zone in front of tuyere on economy of blast-furnace process.

BOILER FEEDWATER

Treatment. A Non-Chemical Method for the Prevention of Scale Accumulation in Boilers, Diesel-Jackets, and Water Circulating Systems in General, A. T. Ridout. Domestic Eng. (Lond.), vol. 48, no. 9, Sept. 1928, pp. 163–165. Method described is physical system of treating water, as distinct from chemical methods and utilizes colloids; describes briefly properties of true colloids; colloidal system also effectively deals with presence of oil in boiler feedwater; system can be used to deal with salt feed. Paper read before Inst. Mar. Engrs., previously indexed.

Treatment of Feed Water. Nat. Elec. Light Assn.—Serial Report, No. 278–81, Aug. 1928, 57 pp., 48 figs. Operation of evaporators under varying ranging of conditions; summarizes more recent results of research; covers briefly results of past reports; cites new cases on caustic embrittlement and covers experiments on new inhibitives, such as sodium phosphate, tannate and sodium acetate; data in connection with electrolytic processes are presented; statement by International Filter Co. on electro-osmosis describes process of purifying water by electrolyzing. Bibliography.

BOILER FURNACES

Pulverized-Coal. Burning Crushed Coal in Suspension, J. F. O. Stratton. Power, vol. 68, no. 12, Sept. 18, 1928, pp. 486–487, 2 figs. Boiler furnaces burning crushed coal suspended in upward blast of air within incandescent furnace have been in operation for two years under commercial conditions; principle of air separation is employed in way to take advantage of variations in specific gravity and volume of coal and its constituents during combustion.

Design and Calculation of Combustion Chambers of Pulverized-Coal Furnaces (Bau und Berechnung der Verbrennungsraeume von Kohlenstaubjeuerungen), H. Ketz. Waerme (Berlin), vol. 51, no. 34, Aug. 25, 1928, pp. 619–625, 10 figs. Notes on combustion-chamber loads; development of new theory of design; thermal efficiency of heating surface of chamber.

BOILER PLATES

Alloy Materials. The Use of Alloy Steels for Boilers, J. V. Romer and W. W. Eaton. Boiler Maker, vol. 28, no. 9, Sept. 1928, pp. 261–262. Corrosion and heat-resisting materials necessary to meet high-temperature and pressure conditions; ultimate tensile strength, elastic limit, elongation, and impact resistance over entire range of temperature for which material is being considered; properties that must be investigated are thermal conductivity and coefficient of expansion; properties of chrome-nickel iron alloys.

Basic Open-Hearth. The Properties of Basic Open-Hearth Steel at Various Temperatures, E. Pohl. Metallurgist (Supp. to Engineer, Lond.), Aug. 31, 1928, pp. 119–120.

Author discusses mechanical properties of certain type of basic open-hearth steel; with increase in working pressure of boilers, 20 to 25-ton steels formerly used for boiler plates have become inadequate, and basic open-hearth steel of greater strength has assumed importance. Review of article translated from Stahl u. Eisen, May 17, 1928.

Testing. Boiler Plate at High Temperatures (Kesselbleche bei erhoehten Temperaturen), A. Pomp. V.D.I. Zeit. (Berlin), vol. 72, no. 36, Sept. 8, 1928, pp. 1262–1265, 12 figs. Abstract of 60-page report, by author and F. Koerber, on study made at Kaiser Wilhelm Institute for Iron Research; 14 specimens of steel and nickel-steel boiler plate were tested for effect of temperature up to 500 deg. cent., effect of cold working age, crystallization, etc.

BOILERS

Design. Investigation of Loading Capacity of Evaporating Surface and Steam Space of Boilers and Pressure Vessels (Untersuchung ueber die Belastungsfaehigkeit der Verdampfungsoberflaeche und des Dampfraumes der Dampfkessel und Verdampfapparate), Eberle. Archiv fuer Waermewirtschaft (Berlin), vol. 9, no. 9, Sept. 1928, pp. 282–283, 2 figs. Brief account and results of investigations, followed by discussion.

Tendencies in Boiler Design. Power Plant Engr., vol. 32, no. 19, Oct. 1, 1928, p. 1029. Design tendencies of power stations in past few years has been toward greater size in generating units and high steaming capacity in boilers; radiant and interdeck superheaters flatten temperature curve; single superheater headers are desirable; high-pressure feedwater control has been improved; boiler capacity increases by by-pass around induced draft fan, Report by Nat. Elec. Light Assn.

High-Pressure. The Design and Construction of High-Pressure Water-Tube Boilers, H. E. Yarrow. Engineering (Lond.), vol. 126, no. 3270, Sept. 14, 1928, pp. 341–342, 2 figs. In author's opinion, in order to utilize steam to best advantage, temperatures as well as pressures must be increased so that overall efficiency of plant is improved, and boiler designer has to study both pressure and temperature problems; pure feedwater only should be furnished to high-pressure boilers; homogeneity as regards compo ition and freedom from defects is essential for forgings which are highly stressed; results of recent tests showing effect of temperature on three different steels. Paper read before Brit. Assn.

Inspection. The Activity and Experiences of the Heat Engineering Bureau of Central German Steam Boiler Inspection Association of Magdeburg in the Fiscal Year 1927 (Taetigkeit und Erfahrungen der Waermestelle der Mitteldeutschen Dampfkesselueberwachungsvereine Magdeburg im Geschaeftsjahr 1927), Berner. Waerme (Berlin), vol. 51, no. 30, July 28, 1928, pp. 556–561. Brief account of results of work covering different fields, including grates for lignite and bituminous-coal firing; boiler and boiler-furnace efficiencies; lignite coke; pulverized-coal firing; superheaters, economizers, air preheaters, reciprocating engines, turbines, Diesel engines, feedwater treatment, etc.

Marine, Pulverized-Coal. The Brand System of Pulverized Fuel. Engineering (Lond.), vol. 126, no. 3270, Sept. 14, 1928, pp. 336–337, 2 figs. Results of tests undertaken by "B & L" Powdered Fuel Ltd., London, at their works at Barugh; test, which lasted 12 hours, was conducted, using ordinary cylindrical Scotch marine boiler fired by means of Brand system.

Vertical, Tubular. A New Steam Boiler, N. Forssblad. Nat. Elec. Light Assn.—Serial Report, No. 278–77, July 1928, p. 12. Details of internally fired single-drum sectional boiler with vertical tubes, designed for use in auxiliary steam plant connected with Swedish hydroelectric station; low installation cost and small space requirement; advantages are short heating-up time and low heating-up losses; disadvantages are small water surface and low water storage.

Waste-Heat. Factors Which Influence the Choice of Waste Heat Boilers, J. B. Crane. Iron and Steel Engr., vol. 5, no. 9, Sept. 1928, pp. 407–412, including discussion, 10 figs. Economical possibilities of waste heat boilers require a study of all problems where there is heat in gases above 1000 deg. fahr., being discharged to atmosphere; if pressures, weight, and character of gases are suitable, return-tubular boiler will give maximum results of at least outlay; otherwise vertical boiler is best; single-pass horizontal boiler is suitable for special conditions and may be used in some cases in place of vertical boilers.

Water-Tube, Design. Calculation of Wall Thickness of Water-Tube-Boiler Sections [Berechnung der Wanddicke von Teilkammern (Sektionen) fuer Wasserrohrkessel], G. Kerff. Archiv. fuer Waermewirtschaft (Berlin), vol. 9, no. 9, Sept., 1928, pp. 292–294, 7 figs. Development of simple formulas for calculation of wall thickness, taking into consideration undulatory form of side walls; calculation of standard section for 35 atmos.; gives table of pressures from 20 to 50 atmos.; vertical sections with standard and flat corrugation.

C

CABLEWAYS

Buckets. Tipping Apparatus for Aerial Ropeways. Indus. Mgmt. (Lond.), vol. 15, no. 9, Sept. 1928, pp. 302–303, 3 figs. Description of device by which buckets can be tipped at predetermined positions in order to effect greatest possible economy and to utilize tipping area to fullest capacity; employed for disposal of coal-mine waste.

Dam Construction. Cableways for the Nag Hammadi Barrage. Engineer (Lond.), vol. 146, no. 3792, Sept. 14, 1928, pp. 284–285, 5 figs. partly on p. 288. Details of cableways, constructed by Henderson and Co. of Aberdeen, for handling materials in construction of dam, being built across Nile River; cableways are erected across Nile at right angles to stream and are disposed so as to command practically whole area of barrage structure, which is about 3000 ft. long by 340 ft. wide; each cableway has clear span of 3100 ft.; each is designed to handle a load of 5 tons on hook.

Passenger, Italy. Aerial Suspension Passenger Cableway from Cortina to Ampezzo (Le funiculaire aerien de Cortina d'Ampezzo), F. Crestin. Génie Civil (Paris), vol. 93, no. 9, Sept. 1, 1928, pp. 212–214, 5 figs. Various regulations for passenger cableways; description of double-line cableway, 1921 m. long in 3 unequal spans; cars hold 18 passengers each; safety devices; cable calculations; supporting cable 45 mm. diam.; traction cable 22.5 mm. diam.

CARS

Tank, Germany. Large Tank Cars in Germany and in United States (Grosskesselwagen in Deustschland und in den U.S.A.), O. Bondy. Glasers Annalen (Berlin), vol. 52, no. 4, Aug. 15, 1928, pp. 45-49, 9 figs. Data and descriptive notes on German tank cars by Krupp, Linke-Hofmann (for Russia) Hannover Waggonfabrik (for India), also of several types of American tank cars; capacities of 45 cu. m. and more.

CASE-HARDENING

Nitration. Recent Developments in the Application of Nitrogen to the Surface Hardening of Steel, V. O. Homerberg. Fuels and Furnaces, vol. 6, no. 9, Sept. 1928, pp. 1153-1157, 9 figs. New series of steels containing aluminum has been evolved which are discussed and method of nitriding is described; nitriding period; uses of nitrided aluminum-alloy steel.

The Process of Surface Hardening of Steel by Nitriding, W. J. Merten. Fuels and Furnaces, vol. 6, no. 10, Oct. 1928, pp. 1371-1376, 4 figs. Detailed description of nitriding process and equipment required; preparation of steel for nitriding; operation of nitriding equipment; control of time, temperature and depth of case; selective nitriding; quenching and tempering.

CASTINGS

Cleaning, Hydraulic. Hydraulic Method of Cleaning Castings, J. Prendergast and H. A. Lincoln. Iron Age, vol. 122, no. 12, Sept. 20, 1928, p. 734. Cleaning castings by water under pressure directed from nozzles in plant of Sullivan Machinery Corp., Claremont, N. H., is described; system of reclaiming sand; cores running in sizes up to 9 x 18 x 66 in. are cleaned out by this method; method has relieved company of hardest labor problem it had to contend with. Abstract of paper presented before New England Foundrymen's Assn.

Welded Steel vs. Costs. Welded Steel Equivalent of Castings, R. W. Capper. Welding Engr., vol. 13, no. 9, Sept. 1928, p. 45. Cost reductions made possible by use of welded steel in machinery construction and designs of parts suitable for this method; manufacture of specific pieces illustrated can be accomplished in any well-equipped steel fabricating hop which is operated in connection with machine shop; costs are based on manufacture in multiple of five pieces at a time, but without use of jigs or fixtures.

CHIMNEYS

Vibrations. Vibration of Chimneys (Schwingungen von Schornsteinen), E. Lehr. Beton u. Eisen (Berlin), vol. 27, no. 16, Aug. 20, 1928, pp. 301-306, 4 figs. On basis of analogy with astatic pendulum and leaf springs, author develops graphical method of computing period of vibration of chimneys for various intensities of lateral impulses; effect of vibrations on stability of structure.

COAL HANDLING

Loading and. Loading and Storing of Friable Bulk Materials (Das Verladen und Lagern umladeempfindlicher Schuettgueter), E. H. H. Aumund. V.D.I. Zeit. (Berlin), vol. 72, no. 35, Sept. 1, 1928, pp. 1221-1224, 7 figs. Paper read at session of management section of 1928 annual meeting of Society of German Engineers (V.D.I.); quantitative empirical data on loss due to crumbling of coal, briquettes, and coke in falling or sliding, under various conditions occurring in practice; practical methods of loading transshipment and handling tending to reduce such losses to minimum.

COPPER ALLOYS

Copper-Cadmium. Notes on the Manufacture and Properties of Some Copper-Cadmium Alloys, W. Bannard. Brass World, vol. 24, no. 9, Sept. 1928, pp. 273-276, 8 figs. Summary of physical properties and methods of alloying these mixtures; preparation of alloys; machining properties; compression tests; hardness on two series of alloys; corrosion tests.

CUPOLAS

Temperature Measurement. Accurate Temperature Measurements in Cupola Practice (Genaue Temperaturessungen im Kupolofenbetrieb), P. Rheinlaeder. Giesserei (Duesseldorf), vol. 15, no. 37, Sept. 14, 1928, pp. 911-917, 9 figs. Discussion of most important temperature-measuring methods, with special regard to measurement of iron temperature in trough, in ladle and in furnace; as continuous measurement of cupola control, author recommends measurement of iron temperature and exhaust-gas temperature.

CUTTING TOOLS

Diamond. Metal-Cutting with Diamonds. Soc. Automotive Engrs.—Jl., vol. 23, no. 4, Oct. 1928, pp. 419-420, 3 figs. Slight pressure and small wear of diamond tool result in fine and accurate finish; finishing of bearing metal and bronze bushings in crankcases and connecting rods; accurate finishing rather than removal of large quantities of stock is greatest use for diamond tools in machining; very high speed possible; new requirements on machines; distinctive requirements for diamond-cutting machine tool.

D

DIE CASTING

Copper Alloys. Die-Casting of Copper-Rich Alloys, R. Genders, C. R. Reader and V.T.S. Foster. Foundry Trade Jl., (Lond.), vol. 39, no. 629, Sept. 6, 1928, pp. 167-170 and 172. Investigation summarized in paper, was undertaken with object of obtaining information regarding process of die casting high-melting-point alloys, material produced, and possibilities of improvement, ultimate aim being widening of scope of use for die casting; present methods of die casting; properties of selected alloys as chill-cast bars and as die castings; color and corrosion characteristics; results of tests. Abstract of paper read before Inst. of Metals.

DIESEL ENGINES

Antechamber Type. Studies of Diesel Engines. The Ante-Chamber Engine (Entersuchungen an der Dieselmaschine die Vorkammermaschine), K. Neumann. V.D.I. Zeit. (Berlin), vol. 72, no. 36, Sept. 8, 1928, pp. 1241-1248, 10 figs. Report from Department of Internal Combustion Engines and Engineering Thermodynamics of Hanover Institute of Technology on experimental studies of performance and mode of operation of 18-hp. one-cylinder four-cycle engine of ante-chamber type; mathematical analysis of combustion phenomena, special merits of ante-chamber type for high-speed Diesel engines.

Compressorless. The Sixty-Seventh Annual Meeting of the Society of German Engineers (V.D.I.), Essen, 1928 (Die 67. Hauptversammlung des Vereins Deutscher Ingenieure in Essen 1928), L. Hausfelder. Motorwagen (Berlin), vol. 31, nos. 18 and 20, June 30 and July 20, 1928, pp. 414-415 and 456-461, 5 figs. Abstracts of principal papers read at sessions on internal-combustion engines, marketing, paints and painting; extensive abstracts of Reinsch's paper on progress in design of compressorless Diesel engines, and of Gosslav's paper on heat control of cylinders of air-cooled airplane engines.

Deutsche Werke. Double-Acting Air Injection Engines. Gas and Oil Power (Lond.), vol. 23, no. 276, Sept. 6, 1928, p. 243. Details of new 6-cylinder Deutsche-Werke design of engine; bore 650 mm.; stroke 1050 mm.; rating of 4200 hp. at 120 r.p.m.; four sets of ports of approximately equal height extend around entire cylinder periphery, two serving upper side of piston and two lower side; accessibility studied; controls placed at camshaft level instead of on floor level.

Double-Acting (M.A.N.). 11,700 B.H.P. Double-Acting Oil Engine. Power Engr. (Lond.), vol. 23, no. 270, Sept. 1928, pp. 341 and 363, 1 fig. Notes on large new German engines built by M.A.N., intended for peak-load service; coupled to generator of Siemens Schuckert makes operating at pressure of 6000 volts; each engine has 10 cylinders 600 mm. in diam. with piston stroke of 900 mm., 11,700 b.hp. being developed at 215 r.p.m.; power produced with brake mean effective pressure of 69.5 lb. per sq. in. and piston speed of 1268 ft. per min.; loop system of port scavenging.

Pulverized-Fuel. Operating Diesel Motors with Coal Dust Fuel, F. E. Bielefeld. Oil Eng. and Technology (Lond.), vol. 9, no. 8, Aug. 1928, pp. 216-218, 5 figs. Original Diesel engine was designed with view to using solid fuel in powder form; MacCullum coal-dust-fired motor, British patent No. 816, of 1891; development not continued, as relatively coarse coal dust caused difficulties; brown-coal-dust now used will pass sieve of 8000 to 10,000 mesh per sq. cm.; fine powder offers large surface of attack to combustion oxygen; Diesel can be fired without auxiliary ignition fuel; brief discussion of German patents. Abstract translated from Technische Blaetter, June 9, 1928.

Valves, Design of. Contribution to the Design and Calculation of Fuel Cams and Fuel Valves for Diesel Engines, J. N. Basu. Nat. Advisory Committee for Aeronautics—Tech. Memorandums, no. 477, Aug. 1928, 32 pp., 22 figs. Investigation of shape of fuel cam and its effect on indicator diagram, on combustion, and on functioning of Diesel engines; dimensions of fuel valve; characteristic constant-pressure diagram is desirable ideal; disadvantages of pointed diagrams; engine with constant-pressure diagram runs more smoothly, can be overloaded, and does not smoke at full nor overload. From Motorwagen, May 10, and July 31, 1927.

E

ELECTRIC FURNACES

Annealing. Alloy Steel Castings Annealed in Car Type Electric Furnaces, M. Rock. Fuels and Furnaces, vol. 6, no. 10, Oct. 1928, pp. 1405-1407, 3 figs. Describes two-car-type furnaces with accurately controlled heating and cooling cycles, used in heat treating great variety of steel castings; furnace cars are 6 ft. wide by 12 ft. long, with loading clearance of 4 1/2 ft. from top of car to spring of arch; each heating chamber requires 375 kw., using T-Grid cast resistor element.

Electric Normalizing and Annealing. Iron Age, vol. 122, no. 14, Oct. 4, 1928, pp. 818-821, 8 figs. Description of electric annealing installed by Timken Roller Bearing Co., for use in production of alloy steels; eight furnaces for slow cooling handle alloy steels at various heating cycles; large pit furnaces a feature; air blast for cooling; special furnace for normalizing chrome steel; two-car-type furnaces for bar stock.

Heat-Treating. Electrically Heated Pusher Type Furnaces Used in Carburizing Automobile Parts, I. S. Wishoski. Fuels and Furnaces, vol. 6, no. 10, Oct. 1928, pp. 1395-1398, 2 figs. Describes pusher-type furnace built by Holcroft and Co., of Detroit, Mich., used by automobile company for carburizing ring gears, side gears, king pins, etc., on 10-12 hr. cycle and quenched direct from boxes; net production, 700 lb. per furnace per hr.; operating economy, 10-12 lb. gross or 3.7 lb. net per kw-hr.

Resistance. The Use of Nickel-Chromium Alloys in Electric Furnaces, A. G. Lobley. Foundry Trade Jl. (Lond.), vol. 39, no. 631, Sept. 20, 1928, pp. 209-210, 2 figs. Electric resistance furnaces are dependent on nickel-chromium alloys for their heating elements; early history of resistance furnaces; with 80/20 nickel-chromium alloy, furnace temperatures as high as 1100 deg. cent. have been recorded; devices for increasing electric load; advantages of electric furnace are exactness of control and flexibility.

ELECTRIC LOCOMOTIVES

Motor-Generator. Performance of Motor Generator Locomotives, P. A. McGee. Ry. Age, vol. 85, no. 10, Sept. 8, 1928, pp. 443-447, 3 figs. On Great Northern motor-generator locomotives, constant horsepower output can be maintained between 15 m.p.h. and 33 m.p.h.; general dimensions of two-unit locomotive; present method of operation; regenerative braking; uniform tractive force; relation of operating methods to power demand.

F

FANS

Induced-Draft. Eliminating Inlet Loss in Induced Draft Fans, G. C. Derby. Power Plant Eng., vol. 32, no. 19, Oct. 1, 1928, pp. 1047-1050, 7 figs. When fan is to be used for induced draft, some sort of duct must be used to connect inlet of fan with gas outlet from boiler; author describes new fan designed to eliminate inlet loss and to save power with constant-speed-motor drive; inlet vanes provide economical method of control; in order to show highest saving with vane control over slip ring motor control, it is advisable to use two constant-speed squirrel-cage motors, one on each end of fan shaft.

FLOW OF LIQUIDS

Pipes. Flow of Brine in Pipes, R. E. Gould and M. I. Levy. Univ. of Ill., Eng. Experiment Station—Bul., vol. 26, no. 2, Sept. 11, 1928, 24 pp., 6 figs. Object of this investigation was to determine relation between friction factor and Reynold's number when commercial calcium-chloride factor and Reynold's number when commercial calcium-chloride brine is circulated in standard wrought-iron pipe under conditions encountered in refrigeration practice; fluids in pipes; types of flow; description of apparatus; methods of conducting tests; comparison of results with brass, steel, and iron pipe; viscosity of commercial calcium-chloride solutions.

FORGING MACHINES

High-Duty. Internal Displacement Principle Aids Forging Practice. Iron Trade Rev., vol.

83, no. 13, Sept. 27, 1928, pp. 778–779, 5 figs. High-duty forging machines are described and remarkable economy with which machine-made forgings now are being produced is discussed; design of dies, heading and gripping slides and air-operated trips. See also Iron Age, vol. 122, no. 13, Sept. 29, 1928, pp. 768 and 769.

FURNACES

Foundry. Notes on a New Furnace for Steel Works Intending to Produce Small Castings, M. G. Lely. Foundry Trade Jl. (Lond.), vol. 39, no. 627, Aug. 23, 1928, p. 132. Furnace designed by author consists essentially of rotary cylinder; its characteristics are that flame could either lap metal or blow over it to bring it to high temperature; blast is heated by recuperation of furnace gases; furnace is supplemented by manufacturing process of reutilization of steel scrap; it is claimed that process will enable malleable castings to be replaced by metal really superior in quality.

G

GASES

Calorific Value vs. Combustion Temperature. The Relation between Calorific Value of Gases and Their Combustion Temperature (Ueber den Zusammenhang zwischen dem Heizwert der Gase und ihrer Verbrennungstemperatur, bzw. die Herleitung und selbsttaetige Aufzeichnung des Heizwertes aus der Temperatur der Abgase), H. Fahrenheim. Waerme (Berlin), vol. 51, no. 33, Aug. 18, 1928, pp. 611–612, 1 fig. Author describes simplified method for determining calorific value by derivation and automatic recording of calorific values from temperature of exhaust gases.

GEARS AND GEARING

Hobs. New Type Gear Hob, G. A. Moore. Machy. (Lond.), vol. 32, no. 827, Aug. 16, 1928, pp. 633–635, 7 figs. Method of grinding hob with disk and pencil-type wheels; semi-ground form hob of French manufacture; in longitudinal rows of teeth every second recess between two adjacent teeth has its walls and root ground to exact dimensions required, while alternate recesses in same row are all made to greater depth; space roots ground at same operation as flanks; high-production hob with spiral cutting action.

Reduction Gears. Reduction Gears at the 1928 Leipzig Fair (Die Reduktions-Getriebe auf der Leipziger Technischen Messe 1928), C. Bluethe. Schweizerische Bauzeitung (Zurich), vol. 92, nos. 11 and 12, Sept. 15 and 22, 1928, pp 139–142 and 148–152, 17 figs. Descriptive notes on Escher Wyss, Krupp, Flender constant-ratio and variable-ratio, friction or chain, speed-reducing gears; also notes on Lauf-Thoma, Enor, Energator and other hydraulic gears.

Tooth Modification. Hob Corrections for Gear Tooth Modifications, J. A. Hall. Am. Mach., vol. 69, nos. 11, 12, and 13, Sept. 13, 20, and 27, 1928, pp. 431–435, 462–472, and 491–493, 20 figs. Sept 13: Analysis of straight-line correction are concluded and method for determination of entrance angle is given and illustrated by use of charts and formulas. Sept. 20: Charts are given and explained to simplify calculation of number of modified teeth in contact under worst conditions so that continuity of action is assured. Sept. 27: Method of analysis for hobs with circular corrections now in use; number of gear teeth in contact is constant for all sizes of gears; comparison of five systems of hob correction now in use.

H

HAMMERS

Power. Foundations of Power Hammers (Hammerfundamente), E. Rausch. Beton u. Eisen (Berlin), vol. 27, no. 17, Sept. 5, 1928. pp. 321–327, 8 figs. Determination of maximum foundation stresses due to single blow of hammer; danger of resonance and how to eliminate it; maximum stress upon anvil determining requisite strength of foundation; reinforcement of foundation block; application of theory of vibrations to problems.

HARDNESS

Measurements of. Apparatus and Methods for Measurement of the Hertzian Hardness, R. Esnault-Pelterie. Engineer (Lond.), vol. 146, nos. 3788, 3789 and 3790, Aug. 17, 24 and 31, 1928, pp. 180–181, 196–197 and 220–222, 9 figs. Method of measurement employed by author in his researches; two spheres are subjected to constant and successively increased pressures; one has very thin coating that renders zone of contact visible after each compression; diameter of circle of contact is then measured, and curve is obtained representing variation of diameter as function of force exerted on two balls. Paper read before Brit. Section of Société des Ingénieurs Civils de France.

HYDRAULIC TURBINES

Design. Alignment Charts as an Aid in the Design of Hydraulic Turbines (Fluchtentafeln und Wanderkurvenblatt als Hilfsmittel beim Entwerfen von Wasserturbinen), E. Thomas. Siemens Zeit. (Berlin), vol. 8, no. 7, July 1928, pp. 403–414, 5 figs. Author demonstrates that by use of charts, means are provided for obtaining most important relations without special knowledge of formulas, and determination of desired values can be obtained by purely mechanical means with least possible need of brain work.

Draft Tubes. Improvements in Draft Tube Result in Large Savings, J. Jacobs. Power, vol. 68, no. 11, Sept. 11 1928, pp. 440–441, 2 figs. Unit treated in this article was installed in 1910; draft tube had been causing trouble, and it was decided to make changes in design; to prevent draft tube from vibrating, it was incased in concrete block resting on rock foundation; improvised elbow added to end served to ease column of water away and practically eliminated all turbulence of water in tailrace; capacity of unit was increased from 1300 to 1525 kw.

Impulse, Speed Control of. The Speed Control of Impulse Turbines. Engineer (Lond.), vol. 146, no. 3790, Aug. 31, 1928, p. 238, 5 figs. Most common device at present in use is "Slipper" deflector; improved device consists of tubular deflector working on ball or roller trunnion bearings which are placed coaxially with nozzle.

Testing. Measurements of Hydraulic Turbine Gate Leakage, E. B. Strowger. Power Plant Eng., vol. 32, no. 19, Oct. 1, 1928 pp. 1051–1052, 2 figs. Turbine-gate leakage means flow or discharge past gates when closed tight and full static head is operating describes methods of measurement, with detailed account of fall-in-pressure method which is most accurate; knowing cross-sectional area of water passage for any elevation, rate of fall in pressure, as determined by accurately calibrated pressure test gage or manometer, will give leakage discharge for various heads. Abstract of N.E.L.A. Hydraulic Power Committee report.

HYSTERESIS

Elastic. Determination of Elastic Hysteresis of Construction Materials by Means of the Torsional Deflection Apparatus (Bestimmung der Werkstoffdaempfung mittels der Verdrehungs-Ausschwingmaschine), O. Foeppl. V.D.I. Zeit. (Berlin), vol. 72, no. 37, Sept. 15, 1928, pp. 1293–1296, 4 figs. Determination of elastic hysteresis as function of distortion; description of Foeppl-Busemann apparatus; results of tests of specimens of steel, copper, glass, wood, etc.; difference between static and dynamic toughness; precision of determination by various apparatus.

I

IMPACT TESTING

Notched-Bar. The Notched-Bar Impact Test [Ueber die Kerbschlagprobe (Schlagbiegeprobe)], E. Honegger and M. Ros. Schweiz. Verband fuer die Materialpruefungen der Technik, Bericht no. 5, March 1927, 63 pp., including discussion, 69 figs. Theory of impact testing, general review of research work; description of Charpy, Izod, Amsler, and Guillery impact-testing apparatus; examples from practice, microstructure of tested specimens.

INDUSTRIAL MANAGEMENT

Budget Control. Simple Budget System Aids in Plant Management, J. J. Berliner. Iron Trade Rev., vol. 83, no. 1, Sept. 20, 1928, pp. 693–695, 4 figs. Preparation of estimates for budget naturally leads to greater standardization of manufacturing processes, and to more careful consideration of expenses; basis for comparison with trend of business; budget procedure; master budget sheet shows yearly performance of all plants, purchases, selling sales, administrative expenses; financial budgeting.

Job Standardization. Lowering Costs by Job Standardization, H. B. Baumbach. Mfg. Industries, vol. 16, no. 5, Sept. 1928, pp. 345–349. Discussion deals with results of time study and job analysis carried over period of 17 years, covering over a million readings developed in chart form for wage calculations in fabricating shops.

Time Studies. Time Studies in the Metal Working Industries (Zeitstudien in der Metallverarbeitenden Industrie), Gottwein. Archiv fuer Waermewirtschaft (Berlin), vol. 9, no. 9, Sept. 1928, pp. 278–282, 8 figs. Author gives examples of time studies in different operations including tube bending; locomotive-boiler assembly; locomotive-frame making, etc.; time study in connection with piece-rate working.

INDUSTRIAL PLANTS

Design. Modern Practice in Location, Layout and Design, C. P. Wood. Chem. and Met. Eng., vol. 35, no. 9, Sept. 1928, pp. 528–530, 2 figs. Discussion of factors that influence plant location; plant arrangement; relation of receiving to storage and shipping departments; vertical and horizontal routing; vibrating loads.

Enlargement. Enlarging the Factory on an Assured Profit-Paying Basis, W. W. Hay. Mfg. Industries, vol. 16, no. 5, Sept. 1928, pp. 333–336, 5 figs. Floor space must yield fair return; plant expansion should be planned according to trends of industry; complete program should be correlated with sales policy; construction under pressure is always costly.

INTERNAL-COMBUSTION ENGINES

Design. Internal-Combustion Engines (Verbrennungsmotoren), F. Schultz, M. Seiliger, F. Romberg and R. Pawlikowski. V.D.I. Zeit. (Berlin), vol. 72, no. 37, Sept. 15, 1928, pp. 1279–1285, 21 figs. Abstracts of papers, read and discussed at sectional session of 1928 annual meeting of German Society of Engineers (V.D.I.), on design of automotive Diesel engines, increasing speed of automotive engines, experiments with Diesel-engine injection nozzles, and pulverized-coal engines.

Heavy Oil. New Methods of Using Fuel of High Boiling Point in Internal-Combustion Engines (Neue Wege zur Verarbeitung hochsiedender Kraftstoffe in Verpuffsmotoren), H. Ellerbusch. Motorwagen (Berlin), vol. 31, no. 24, Aug. 31, 1928, pp. 551–558, 5 figs. Greater economy and safety of heavy oils as fuel; description of vaporizing cylinder, manufactured by Gesellschaft fuer Kohlentechnik which makes possible use of heavy fuel oils in ordinary internal combustion engine without unfavorable effect on lubricating oil and other customary disadvantages; results of tests carried out on 4-cylinder motor-truck engine.

Supercharging. Supercharging for Sea-Level Conditions, C. F. Taylor and L. M. Porter. Soc. Automotive Engrs.—Jl., vol. 23, no 4, Oct. 1928, pp. 359–361. Discussion of annual meeting paper printed in February issue of magazine; brief abstract of paper given; further refinement of apparatus used by authors is said to be desirable and some of results obtained are criticized; advantages of centrifugal type of super-charger outlined; effects of supercharging on thermal efficiency; mixture temperature and spark advance should be considered when fitting supercharger to engine.

[See also AIRCRAFT ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; MOTOR TRUCKS; OIL ENGINES.]

IRON FOUNDRIES

Practice. Present and Future Problems of Iron-Foundry Practice (Gegenwaertige und zukenftige Probleme im Eisengiessereiwesen), T. Geilenkirchen. Giesserei (Duesseldorf), vol 15, no. 35, and 36, Aug. 31 and Sept. 7, 1928, pp. 853–860 and 889–899, 16 figs. Problems of materials selection; production of high temperature; cupola problems; drying of molds; molding sand and molding problems; core-making; foundry flasks; casting processes; cleaning of castings; problems of management, materials handling, flows of work, time studies, and employment problems.

L

LACQUERS

Cellulose Type. The Development of Duco Type Lacquers, M. J. Callahan. Chem. and Industry (Lond.), vol. 47, no. 34, Aug. 24, 1928, pp. 232T–239T, 3 figs. Historical development; economic and chemical factors; cellulose nitrate of low viscosity; heat methods of reducing viscosity; combined heat and alkaline methods of reducing viscosity; commercial applications; properties of automobile finishes; durability; application properties; growth of use of lacquers; economic results; lacquer influence on color and style; stimulation of research.

LATHES

Testing. Determination of the Efficiency of a Lathe (Wirkungsgradbestimmung an einer

Drejbank), M. Coenen. Maschinenbau (Berlin), vol. 17, no. 7, Sept. 6, 1928, pp. 806–809, 6 figs. Author describes construction and method of testing efficiency of Reinecker constant-speed-drive lathe; tests made at testing laboratory of Chemnitz Gewerbeakademie.

LOCOMOTIVES

Electric. See ELECTRIC LOCOMOTIVES.

Fuel Economy. Steam and Fuel Economy Devices on American Locomotives. Engineer (Lond.), vol. 146, no. 3789, Aug. 24, 1928, pp. 197–198. Brief review of some of these devices is given, including: cast-steel ashpans; cast-steel smoke boxes; draft-equalizing grates; forced draft for locomotives; new forms of blast pipes; steam-distribution devices; feedwater heaters; direct steaming at engine houses.

Internal-Combustion. An Internal Combustion-Engined Locomotive. Gas and Oil Power (Lond.), vol. 23, no. 276, Sept. 6, 1928, p. 237, 1 fig. Details of 6-cylinder vertical-type engine built by National Gas Engine Co., and locomotive built by Hudswell Clark and Co. for use on plantations in Australia where coal for fuel is not available; engine is designed to run on gasoline, paraffin, or wood alcohol; easy starting attained by 3 1/2-hp. air-cooled engine; power unit is capable of developing 102 hp. at 1000 r.p.m.

Packing Rings, Machining of. Device for Machining Locomotive Packing Rings, W. Salmon. Ry. Mech Engr., vol. 102, no. 9, Sept. 1928, p. 520, 4 figs. Tool post and chuck in which 44 different sizes of locomotive packing rings can be machined, complete, on lathe; with aid of device, author supplies all locomotive packing rings for Chicago, St. Paul, Minneapolis and Omaha system; average of 50 of largest-size packing rings can be machined, complete, in 8-hour day.

Pulverized-Coal. The A.E.G. Pulverized-Coal Locomotive (A locomotive AEG de combustivel pulverisado), W. Kleinou. Revista Brasilieira de Engenharia (Rio de Janeiro), vol. 8, nos. 6 and 7, June and July 1928, pp. 210–220, and 249–259, 23 figs. Increasing use of pulverized fuel; principle upon which burning of pulverized fuel is based; pulverized fuel for locomotive boilers; development of A.E.G. system of combustion for pulverized-fuel locomotives.

Steam-Turbine. Development of Boiler Design for Steam Turbine Locomotives. Boiler Maker, vol. 28, no. 9, Sept. 1928, pp. 258–260, 6 figs. Boilers to carry 450 lb. pressure will be one-third of standard boiler weight; proposed design for 2500-hp. steam-turbine locomotive suitable for either heavy passenger or fast freight service; starting tractive force to be 100,000 lb. and maximum speed 65 mi. per hr.; boiler of water-tube type; pulverized-coal burners; feed-water heater, pump, and injector.

LUBRICATING OILS

Automotive, Viscosity of. Viscosity Most Important Property, H. C. Mougey. Oil and Gas Jl., vol. 27, no. 18, Sept. 20, 1928, pp. 149, 150 and 155. Discusses lubricating oils for automobiles, stressing importance of viscosity; car-operating speed and changes in temperature are main factors that affect specifications as to viscosity; crankcase dilution; sulphur in gasoline; devices to keep water and dirt from lubricating oil; with engines properly fitted with such devices, it is not necessary to drain at frequent intervals.

LUMBER

Drying by Superheated Steam. Drying by Means of Superheated Steam (Trocknung mittels ueberhitzten Dampfes), K. Heinrich. Waerme (Berlin), vol. 51, no. 35, Sept. 1, 1928, pp. 641–643, 1 fig. Description of new application of method described by E. Hausbrand for drying of wood sticks for match industry; principle underlying calculation; results of tests; comparison of new method with old system of drying by air.

M

MACHINE SHOPS

English. The Edgwick Works of Alfred Herbert, Ltd. Engineer (Lond.), vol. 146, no. 3791, Sept. 7, 1928, pp. 248–251, 9 figs. Activities of Alfred Herbert, Ltd., machine-tool makers of Coventry, have been divided between two factories separated by distance of some three miles; two establishments have not been amalgamated and following notes give some idea as to how process of transference has been accomplished without any interference with program of production, and indicate extent of firm's present equipment.

MACHINE DESIGN

Forked Ends. Standardized Forks and Motion Pins. Machy. (Lond.), vol. 32, no. 829, Aug. 30, 1928, pp. 686–687, 9 figs. Suggestion for standardized range of forked ends and motion pins, designed with view to facilitating cheap production; principal proportions of forks are based on diameter of motion pin and are easily remembered by draftsman.

MACHINE TOOLS

Exhibition, London. Machine Tool Exhibition, Olympia. Engineer (Lond.), vol. 146, nos. 3791 and 3792, Sept. 7 and 14, 1928, pp. 251–256 and 274–280, 40 figs. Exhibition represents distinct advance in general character of technical exhibitions in Great Britain; general impressions given; brief descriptions of exhibits according to makes. See also special 16-page supplement in issue of Sept. 7, 1928, giving descriptions of exhibits.

Time Recorders. The Diagnostiker. Machy. (Lond.), vol. 31, no. 801, Feb. 16, 1928, pp. 645–646, 6 figs. Description of device developed by G. Peiseler, with object of providing rate fixer with complete time and motion study of movements of operator and machine in completion of given job.

MALLEABLE-IRON CASTINGS

Production Costs. Burden, Melting, and Annealing Costs for High-Grade Malleable Castings (Gattierungs, Schmelz und Gluehkosten fuer hochwertigen Temperguss), R. Stotz. Giesseri (Duesseldorf), vol. 15, no. 37, Sept. 14, 1928, pp. 905–911, 5 figs. Calculation of costs of burden, melting, and annealing, and comparison with one another; description of latest melting process, utilizing Brackelsberg pulverized-coal drum furnace.

MATERIALS HANDLING

Construction Work. Materials Handling at Conowingo. Elec. World, vol. 92, no. 13, Sept. 29, 1928, p. 600, 3 figs. Illustrations are presented of unusual materials-handling methods in construction of dam and ower house at Conowingo, Md.; illustrations include specially constructed traveling derrick and construction bridge and gantry travelers for work on dam.

Electric Manufacturing Plants. 25 Per Cent Cut in Handling Costs, E. J. M'Ills. Mfg. Industries, vol. 16, no. 5, Sept. 1928, pp. 329–332, 6 figs. Description of materials-handling equipment used in Pittsfield works of General Electric Co. which employs about 6000 workers and is engaged in manufacture of transformers, lightning arresters, cut-outs, concrete reactances and small electric motors.

Foundries. Handling Castings from Shakeout to Cleaning Room. Iron Trade Rev., vol. 83, no. 11, Sept. 13, 1928, pp. 631–632, 4 figs. Materials-handling system in two plants of Lakey Foundry Co., Muskegon, Mich., is described; in cylinder-block foundry, 150 specially designed trucks used and two gasoline tractors procedure outlined; in foundry for smaller castings circulation of individual units is faster. See also Foundry, vol. 56, no. 17, Sept. 1, 1928, pp. 714–716.

Grab Buckets. Progress in the Design of Grab Winches. Demag News (Duisburg), vol. 2, no. 4, Oct. 1928, pp. 81–91, 24 figs. Single-rope or chain grabs and twin-rope or chain grabs compared; principle of automatic grab buckets; winch gear with slipping clutch and fixed coupling for hoisting and lowering grab with jaws open; safety-control gear preventing unpremeditated closing or crashing of grab; advantages of two-motor winches; difficulties in control; characteristic stages in development of Demag differential-gear winch.

MECHANISMS

Motion Analysis of. How Motion of a Mechanism May be Analyzed Geometrically, W. Samuels. Automotive Industries, vol. 59, nos. 11 and 12, Sept. 15 and 22, 1928, pp. 366–369 and 406–408 and 417, 3 figs. Sept. 15: Method by which motion of mechanism can be analyzed completely from its geometry, and automotive applications given; differential calculus involved is explained to make method accessible to every engineer; distances, angles, times and speeds dealt with; application to driven end of crank train. Sept. 22: Application to engine valve cams; cam with outline composed of circular arcs, and contacting with flat plate on rocker arm; value of sliding reduction.

MERCURY-VAPOR PROCESS

Developments in. Tendencies in Development of Vapor Engines Using One or More Working Fluids (Entwicklungsrichtung der Ein-und Mehrstoffdampfmaschinen), W. Gumz. Brennstoff und Waermewirt-schaft (Halle), vol. 10, nos. 12 and 13, June 2 and July 1, 1928, pp. 223–227 and 241–247, 10 figs. General theoretical discussion of limit to increase of steam pressures, "Carnotization" of thermodynamic cycles, non-aqueous vapors as working substances; theory and practice of binary and mercury-vapor systems; merits of non-aqueous vapor engines using one working fluid.

METALS

Fatigue. Fatigue Phenomena, With Special Reference to Single Crystals, H. J. Gough. Roy. Soc. of Arts—Jl. (Lond.), vol. 76, nos. 3955 and 3956, Sept. 7 and 14, 1928, pp. 1025–1044 and 1045–1062, 9 figs. Sept 7: Fatigue strength of metals related to external straining forces (stress effects); stress systems employed in laboratory and some typical testing machines; effect of frequency of applied cycle of stress upon endurance limit; influence of mean stress of cycle on limiting range of stress. Sept. 14: Influence of sudden changes of section and of surface defects upon fatigue strength of metals.

Testing. On Thermal Brittleness in Metals, T. Inokuty. Tohoku Imperial Univ.—Sci. Reports (Sendai), vol. 17, no. 4, July 1928, pp. 817–842, 18 figs. Abnormal increase of strength in steels at temperature range of about 200–300 deg. cent., is usually explained by theory of hardening due to deformation of material; if so, other metals will also show similar phenomenon at certain temperatures; writer made some experiments on aluminum, 4:6 brass, copper, lead, tin, zinc, and Armco iron, and confirmed above conclusion.

MILLING MACHINES

High-Speed-Steel. The Influence of Degree of Elongation and Upsetting on Efficiency of High-Speed-Steel Milling Machines (Ueber den Einfluss des streckungs und Stauchungsgrades auf die Leistungsfaehigkeit von Schnellstahlfraesern), R. Hohage and R. Rollett. Stahl und Eisen (Duesseldorf), vol. 48, no. 36, Sept. 6, 1928, pp. 1243–1247, 14 figs. Examples are given of structure and fracture of high-speed steel disks for milling machines; results of tests show that certain degree of elongation and upsetting is necessary, for milling machine of high-grade high-speed steel to show maximum efficiency.

Hydraulic Feed. Hydraulic Drive for Milling Machines (Hydraulischer Fraesmaschinenantrieb), H. Narath. Maschinenbau (Berlin), vol. 17, no. 7, Sept 6, 1928, pp. 818–821, 8 figs. Purpose, construction, and method of operation of table feed of milling machines; relation between liquid pressures and cutting resistance; function and operation of differential regulating valve.

MOTOR TRUCKS

Diesel Engines for. The Saurer Diesel Lorry Engine. Motor Transport (Lond.), vol. 47, no. 1224, Aug. 27, 1928, pp. 251–252, 2 figs. New 6-cylinder unit for 6-ton chassis and results obtained on road trial in Switzerland are described; engine with 4 cylinders has 110 by 780-mm. bore and stroke; operating on 4-cycle principle, engine has 2 valves per cylinder mounted vertically in head and operated by pushrods and rockers, this mechanism being exactly same as on gasoline engine; comparison with gasoline engine.

O

OIL ENGINES

Airless-Injection. A 935 B.H.P. Airless-Injection Oil Engine. Engineer (Lond.), vol. 146, no. 3793, Sept. 21, 1928, p. 324, 1 fig. Details of Davey-Paxman 8-cylinder engine embodying patented system of spring injection: it has 15 1/2-in. diam. cylinder and stroke of 20 in.; outstanding feature is that engine is fully enclosed and that it works on forced-lubrication system, operating at normal pressure of 10 lb. per sq. in.

Double-Acting Marine. A 4000 B.H.P. Double-acting Two-stroke Oil Engine. Engineer (Lond.), vol. 146, no. 3790, Aug. 31, 1928, pp. 234–236, 3 figs. Engine, constructed for submarine repair and depot ship Medway, differs in some respects from standard design of licenses, mainly with regard to auxiliaries and special provisions made in order to meet Admiralty practice; there are four working cylinders, with bore of 27 ft. 6 in., and stroke of 47.25 in., which are arranged in two pairs, with three-stage air-injection compressor between second and third cylinders.

OPEN-HEARTH FURNACES

Design. Information on Construction of Open-Hearth Furnaces in United States (Données sur la construction des fours Martin aux Etats-Unis), F. Lepersonne. Revue Universelle des Mines (Liége), vol. 19, no. 3, Aug. 1, 1928,

pp. 109–123, 9 figs. Types and capacities of furnaces; description of stationary furnaces, their foundations and lining; doors; brick lining and lining of clay of magnesia; cooling of masonry; recuperators and dust chambers; mean life of different parts of furnaces.

P

PAINT

Testing. Wear of Protective Paints of Vehicles (Beanspruchung von Schutzanstrichen an Fahrzeugen), O. Koenig. V.D.I. Zeit. (Berlin), vol. 72, no. 35, Sept. 1, 1928, pp. 1213–1219 and (discussion) 1219–1220, 31 figs. Paper read at session of paint section of 1928 annual meeting of Society of German Engineers (V.D.I.), reporting tests and observations, at Magdeburg-Salbke railroad yards, on slabs painted with cellulose, wood-oil, and linseed-oil paints; agreement between these observations and performance under actual service conditions; observations on painted freight cars, coal cars, etc.; discussion.

PIPE LINES

Welding. The Strength of Welds in Pipe Lines, J. B. Graham. Oil and Gas Jl., vol. 27, no. 15, Aug. 30, 1928, pp. T-148, T-151, T-153, and T-156, 17 figs. Results of tests conducted by Eastern manufacturer are given in tabular form and shown in illustrations; merits of different welding methods compared.

PLATES

Rectangular. Experiments with Simply Supported Rectangular Plates Carrying Single Concentrated Loads (Versuche mit freiaufliegenden rechteckigen Platten unter Einzelkraftbelastung), M. Bergstraesser. Forschungsarbeiten auf dem Gebiete des Ingenieurwesens (Berlin), vol. 302, 1928, 25 pp., 55 figs. Report from department of applied mechanics of University of Goettingen; fundamental equations of theory of plates; Nadai solution; details of experimental equipment and methods for testing square and rectangular glass plates; results of tests compared with computations based on Nadai theory.

POWER

Costs. Costs of Effective Horsepower-Hour for Various Types of Prime Movers for Powers Less than 200-Hp. (Prix de revient du cheval-heure effectif pour divers types de force motrice pour des puissances inferieures à 200 chevaux), Géronimi. Chaleur et Industrie (Paris), vol. 9, no. 100, Aug. 1928, pp. 459–462, 10 fig. Treats of electric power; gasoline, Diesel, lean gas, and steam engines; choice of type of motive power.

POWER PLANTS, DIESEL

Woodworking Plants. Why Diesel Engines Were Selected and the Results, W. G. Schaphorst. Indus. Woodworking, vol. 28, no. 12, Sept. 1928, pp. 56 and 58, 1 fig. Why New York City woodworking concern abandoned use of central-station electric current, and what it saved by installing Diesel engines to drive its own electric generators.

POWER PLANTS, STEAM

Ash Handling. Ash Handling in Boiler Houses (Die neuzeitlichen Mittel zur Abfoerderung der Asche in Kesselhaeusern), Wintermeyer. Foerdertechnik u. Frachtverkehr (Wittenberg), vol. 21, no. 13, June 22, 1928, pp. 243–247, 8 figs. Critical review of ash-handling practice in modern boiler houses; mechanical ash-handling devices, apart from other objections notes, involve considerable amount of manual labor in ash basement; in some cases, particularly in flame tube boilers mechanical appliances can be used to advantage; generally, hydraulic removal of ashes is simplest and most economical system. See brief translated abstract in Eng. and Boiler House Rev. (Lond.), vol. 42, no. 3, Sept. 1928, p. 145.

Combined Heating and Power. Combining Power and Heat (Kupplung von Kraft und Waerme), A. G. Ernst. Archiv fuer Waermewirtschaft (Berlin), vol. 9, no. 9, Sept. 1928, pp. 299–300, 1 fig. Conversion of boiler and engine operation from 10 to 25 atmos. and introduction of back-pressure system in chemical plant, are described; in same machinery space, double amount of heat is now generated; savings effected amount to nearly $25,000.

Europe. Summary of European Developments, A. G. Christie. Nat. Elec. Light Assn.—Serial Report, No. 278–77, July 1928, pp. 1–2. Developments in high-pressure boilers; pulverized coal; air heaters; furnaces; prime movers; peak loads.

Flue-Gas Recorders. Power House Measurements. World Power, vol. 10, no. 57, Sept. 1928, pp. 271–274, 6 figs. Combustion controlled by reference to flue-gas analysis can be made more efficient and economical and more regular steam production and pressure maintained; some apparatus available for this work is described; control by carbon-dioxide records; types of recorders; carbon-monoxide measurements.

High-Pressure. The Economy of High-Pressure Power Plants (Die Wirtschaftlichkeit von Hochdruckdampfanlagen), W. Schultes. Waerme (Berlin), vol. 51, no. 30, July 28, 1928, pp. 546–555, 14 figs. Notes on heat and economy balance; calculation of overhead; permissible initial costs for high-pressure plants.

Operation Schedules. Scheduling Units in the Power Plant, D. C. Zimmermann. Power, vol. 68, no. 23, Sept. 25, 1928, pp. 515–518, 12 figs. Scientific study worked out to practical conclusions; author shows how to compute schedules of boiler and turbine operation for maximum overall plant efficiency; substantial savings can be made by adhering to such schedules.

Railroads. Modern Boiler Plant for Railway Service. Power Plant Eng., vol. 32, no. 18, Sept. 15, 1928, pp. 998–1000, 8 figs. High Pressure direct-steaming plant of Texas and Pacific Railway at Ft. Worth uses highest operating pressure for this service; natural gas proved to most advantageous fuel; steam considered best drive for compressors; complete instrument layout records operation.

Textile Mills. Power Practically a By-Product in New Steam Plant Development in Cone Mills, D. G. Woolf. Textile World, vol. 74, no. 10, Sept. 8, 1928, pp. 15–16, 2 figs. Unit based on quantity of steam required for process and heating purposes; two new Heine boilers are replacing 35 boilers; each boiler is 863 hp.; pulverized coal is used as fuel; General Electric Co. double-extraction type turbine, 3500 kw.; transportation of steam.

POWER PLANTS, STEAM-ELECTRIC

Berlin. Klingenberg Central Station at Berlin (La centrale thermique Klingenberg, A Berlin). Génie Civil (Paris), vol. 93, no. 10, Sept. 8 1928, pp. 225–230, 12 figs. Describes electric generating plant including boilers, turbo-generators, and condensers; 16 boilers each of 1800 sq. m. heating surface; pulverized-coal burning; three generating groups of 88,000 kw.

Germany. Three Continental Stations, W. H. Fulweiler. Nat. Elec. Light Assn.—Serial Report, No. 278–77, July 1928, pp. 2–6, 3 figs. Details of Langerbrugge and Rummelsburg central stations; Benson Boiler installation at Cable Works of Siemens-Schuckert Co.; operation of this boiler.

Long Beach, Calif. Provision Made for Three Fuels at Long Beach, G. A. Fleming. Elec. World, vol. 92, no. 14, Oct. 6, 1928, pp. 672–679, 13 figs. New building, plant No. 3, has been started adjacent to two older stations for ultimate of eight large units; turbine is General Electric tendem-compound unit with 18-high-pressure and 3 low-pressure double-flow stages; steam is bled at four points; 3 Babcock and Wilcox boilers are provided for 90,000-kw. unit; oil and natural gas are used as fuels, burned in combination Peabody burners. See also editorial comment on p. 671.

Signal Transmitters. Meter Readings and Signals Transmitted by Selsyn Motors, A. E. Bailey. Power, vol. 68, no. 11, Sept. 11, 1928, pp. 434–435, 4 figs. Although applications described are in power house, system is applicable to wide range of uses in industrial processes; Whippany station of Jersey Central Power & Light Co. problem of rapid and reliable communication was solved by use of a.c. self-synchronous indicators; sold under trade mark "selsyn;" they are essentially small motors which, when interconnected, function so that if one motor of combination is turned, other reproduces same angle at distant point.

POWER TRANSMISSION

Mechanisms. Development of Oscillating Power-Transmitting Mechanisms (Die Entwicklung schwingender Leistung ueber tragender Mechanismen), H. Schieferstein. Maschinen au (Berlin), vol. 17, no. 7, Sept. 6, 1928, pp. 809–814, 17 figs. Use of oscillating mechanisms in practice; hydraulic bell-ringing machine, acoustic supervision of condition of rail lines, pseudo-harmonic vehicle springs, universal sieves, etc.

PUMPS

Screw Viscosity. Screw Viscosity Pumps, H. S. Rowell and D. Finlayson. Engineering (Lond.), vol. 126, nos. 3268 and 3272, Aug. 31 and Sept. 28, 1928, pp. 249–250 and 385–387, 13 figs. Aug. 31: Pump, which was first demonstrated by J. Dewrance in 1922, consists of rotor on which are cut right and left-hand screw threads; rotor turns within closely fitting sleeve and is forced by viscous drag to delivery port. Sept. 28: Discussion of experimental results.

PUMPS, CENTRIFUGAL

Velocity Head. Velocity Head on Centrifugal Pumps, G. H. Gibson. Can Engr. (Toronto), vol. 55, no. 11, Sept. 11, 1928, pp. 297–298, 2 figs. Author explains meaning of velocity head in efficiency guarantees for benefit of potential purchasers; comparison between pumps having discharge nozzle smaller than suction nozzle and those having both nozzles of same size.

PUNCH PRESSES

Tools for. Double-production Press Tools. Machy (Lond.), vol. 32, no. 828, Aug. 23, 1928, pp. 661–663, 8 figs. Description of tools for producing two or more components per stroke of press; double-production cropping tool; trimming and piercing tool for two components; pierce and blank tool for producing two different blanks; double-production tool for pipe clips; tool for producing right-hand and left-hand brackets.

R

RAILROADS

Switches, Spring. South Shore Line Uses Spring Switches on Heavy Traffic Line, B. L. Smith. Ry. Age, vol. 85, no. 10, Sept. 8, 1928, pp. 455–456, 3 figs. Developments in application of oil-buffered spring switches made on Chicago, South Shore and South Bend, electrified railroad; fast schedules maintained; special features of switch construction; automatic signals afford protection; results obtained were so satisfactory that two other layouts are planned for early installation. See also Ry. Signaling, vol. 21, no. 8, Sept. 1928, pp. 331–332, 3 figs.

Tracks, Vibration. Dynamics and Vibrations in Railroad Track (Dynamik und Schwingungen des Eisenbahnoberbaues), Saller. V.D.I. Zeit. (Berlin), vol. 72, no. 38, Sept. 22, 1928, pp. 1323–1329, 19 figs. Paper, read at Darmstadt conference on vibrations of Society of German Engineers (V.D.I.), on effect of vibrations on railroad track and its bearing on selection of materials and type of construction for ties and rail joints; methods of measuring vibration stresses; description of Okhuizen and Geiger instruments; comparison of simultaneous vibration records, obtained by Geiger and Okhuizen instruments, for trains moving with velocities of from 22 to 90 km. per hr.

RAILWAY MOTOR CARS

Gasoline. Buda Develops Heavy-Duty Motor Car. Ry. Age, vol. 85, no. 10, Sept. 8, 1928, pp. 464–465, 2 figs. Chassis, which is built like that of motor truck, is of steel construction, and can be furnished for loads of from 8000 to 20,000 lb., depending on engine used; car may be equipped with any one of five different models of Buda four- and six-cylinder heavy-duty gasoline engines, providing range of from 37 to 114 b.hp.; transmission is of standard automotive type; clutch is of multiple-disk type, while internal-gear clutch is used for engaging forward and reverse gears; axles are of heat-treated nickel steel, with bearings of enclosed roller type.

REFRIGERATION

Evaporating Systems. Modern Refrigeration Evaporating Systems, G. Hilger. Refrig. Eng., vol. 16, no. 4, Oct. 1928, pp. 99–106 and (discussion) 106–109, 14 figs. Paper on evaporating systems for ice making and refrigerating plants; discusses thermodynamic functions of evaporators, including considerations of quality of gases leaving evaporators, kinds and types of modern evaporating systems, methods of operation and control, commercial applications of various types of equipment.

The Evaporating System, F. P. MacNeill. Ice and Cold Storage (Lond.), vol. 31, no. 366, Sept. 1928, pp. 225–228, 1 fig. Reflections by operating engineer on improving ice tank economies; brine cooler; advantages of tube cooler; evaporation operating principles; flood ice tank coil; frost on suction pipe; conditions for frosting; distribution of liquid; ice tanks on different floors; drawbacks of some accumulators; evaporating system needs more attention.

ROCKET PROPULSION

Engines for Automotive Vehicles. Economy of Rocket Engines for Vehicles (Zur Frage der Wirtschaftlichkeit des Raketenantriebes fuer irdische Fahrzeuge), H. S. Senftleben. Zeit. fuer Flugtechnik und Motorluftschiffahrt (Muenchen), vol. 19, no. 16, Aug. 28, 1928, p. 367, 1 fig. Short theoretical note on variation of efficiency of rocket drive with speed of gas expulsion from rocket cylinders.

Theory. Rocket Propulsion by Means of the Explosion Wave (Der Raketenantrieb durch die Explosionswelle), K. Baetz. Maschinen-Konstrukteur (Leipzig), vol. 61, no. 16/17, Aug. 15 and Sept. 1, 1928, pp. 370–373, 1 fig. Brief account of experimental work of Berthelot, Mallard, Le Chatelier and Dixon on propagation of flame in tubes filled with combustible gas mixtures; mathematical analysis of phenomenon; applicability of principle to gas turbines and to rocket engines.

ROLLING MILLS

Equipment. Increasing the Output of a Small-Section Rolling Mill. Demag News (Duisburg), vol. 2, no. 4, Oct. 1928, pp. 92–94, 5 figs. Description of hot-bed roller bed with four troughs for small-section rolling mill having 11-in. rolls by introduction of which performance of mill was increased by 60 per cent; details of coil machines and coil-delivering plant.

Metal Flow in Rolling. Experimental Investigations on Metal Flow in Rolling, N. Metz. Rolling Mill Jl. (formerly Iron and Steel World), vol. 2, nos. 8 and 9, Aug. and Sept., 1928, pp. 307–310, and 363–366, 19 figs. Aug.: Tensile stresses on side planes caused by lowering of elongation; determination of amount of spread. Sept.: Flow of metal in gripping angle and oval pass; spread diagrams of flats can be used to advantage in calculation of spread in oval.

Strip Mills, Germany. Design and Operation of Strip Mills, R. W. Deimel. Blast Furnace and Steel Plant. vol. 16, no. 9, Sept. 1928, pp. 1183–1186, 7 figs. Development of strip steel demand in Germany and evolution of mill equipment to meet requirements; interesting features of design are brought out and production figures cited; trend toward wider strips; specifications are becoming stricter; improvements in rolling narrow strip. Translated from Stahl and Eisen.

S

SCREW THREADS

Gages, Taper Gages, Measurement of. The Measurement of Taper-screw Thread Gauges, J. E. Baty. Machy. (Lond.), vol. 32, no. 827, Aug. 16, 1928, pp. 617–621, 13 figs. Methods of inspecting outside, effective, and core diameters of taper screw plug gages, which are applicable to British Standard pipe Briggs, American Petroleum Institute or any other standard thread and taper; measuring fixture described and formulas for easy computation given.

Measurements. Rational Measurement of Elements of a Screw-Thread with Wires (Détermination rationnelle des éléments d'un filetage à l'aide de "piges"), L. Fraichet. Génie Civil (Paris), vol. 93, no. 10, Sept. 8, 1928, pp. 238–240, 3 figs. Describes principles of thread pitch and diameter measurements of screw threads by means of wires and micrometers and formulas used.

SHEARS

Plate. A Giant Plate Shear. Eng. Progress (Berlin), vol. 9, no. 9, Sept. 1928. p. 251, 1 fig. Berlin-Erfurter Maschinenfabrik Henry Pels and Co. completed one of largest gear-driven plate shears so far in existence; it is 20 ft. high, 18 ft. wide and gives maximum length of cut of 108 ft.; sides of press are made from armor plates and are guaranteed against breakage at any time; for drive 150-hp. motor is provided; knives are brought into operation by patented quick-acting jaw clutch equipped with safety device for insuring full engagement of teeth while they are in operation.

SPRINGS

Machine for Testing. The Elasticometer. Machy. (Lond.), vol. 32, no. 831, Sept. 13, 1928, p. 786, 2 figs. Details of spring-testing machine put on market by Coats Machine and Tool Co.; object of machine is to provide means whereby large range of springs can be rapidly tested by unskilled labor; machine is suitable for compression tests on springs of diameters from 1/8 to 2 1/2 in., and lengths from 1/4 to 6 in., and on springs from 6 to 8 1/2 in. long, of diameters from 1/8 to 7/8 in.

STEAM CONDENSERS

Arc Welding of. Building Surface Condensers By Arc Welding, B. H. Nichols. Power, vol. 68, no. 11, Sept. 11, 1928, pp. 436–437, 2 figs. In author's opinion advantages of arc-welded steel-plate construction would be very pronounced in building of surface condensers; greater mechanical strength and less possibility of leakage would be most obvious results; accompanying drawings represent typical condenser fabricated by welding. Article submitted in Lincoln Arc Welding Prize Contest.

STEAM ENGINES

Marine, Bauer-Wach System. Economical Method of Marine Propulsion. Modern Transport (Lond.), vol. 20, no. 498, Sept. 29, 1928, p. 9, 2 figs. Value of exhaust-steam turbines; trials of Anchor Line steamer Britannia demonstrated fully high value of Bauer-Wach exhaust steam turbine as auxiliary to reciprocating steam engines; has quadruple expansion engines of latest and most economical type; represents fifth expansion; big saving in fuel; further economies possible.

Thermal Analysis. Thermal Analysis of Internal Combustion or Steam Piston Engines (Analyse thermique des moteurs a piston a explosion ou a vapeur), M. Bouffart. Revue Universelle des Mines (Liege), vol. 19, no. 5, Sept. 1, 1928, pp. 197–229, 4 figs. Discusses 2- and 4-stroke engines and closed thermodynamic cycle; for internal combustion and steam engines; action of cylinder walls; comparison of steam engines.

STEAM HEATING

Central, Coke Firing in. Heat Utilization in Coke-Fired Boilers of Central Heating Plants (Die Waermeausnuetzung in koksgeheizten Sammelheizungskesseln). Gesundheits-Ingenieur (Munich), vol. 51, no. 33. Aug. 18, 1928, pp. 529–537, 18 figs. Report from department of heat engineering of Darmstadt Institute of Technology, describing elaborate experimental study: also test of central heating plant of Giessen University clinics showing that efficiency of coke-fired plants with variable load may be in excess of 70 per cent.

STEAM LOOPS

Modified. A Modified Steam Loop, W. L. Parker. Power, vol. 68, no. 11, Sept. 11, 1928, p. 450, 1 fig. Illustration shows loop that is used to lift condensation from low-pressure steam mains in tunnels and discharge it into return pipes at higher level; steam loop has advantage of reliable operation without much attention from engineer; its operating costs is less than that of steam pump and condensate receiver.

STEAM METERS

Orifice. Measuring Steam Flow by Means of Diaphragm Orifices (Stauring-Mengenmessung von stroemenoem Dampf), W. Pflaum. V.D.I. Zeit. (Berlin), vol. 72, no. 37, Sept. 15, 1928, pp. 1297–1301, 18 figs. Report from mechanical laboratory of Danzig Institute of Technology treating of correct construction of diaphragm orifice meters; condensing steam and other factors interfering with precision of effect of various factors; results compared with those of other investigators. See also Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, no. 298, previously indexed.

STEAM PIPE LINES

Flexibility. The Flexibility of Plain Pipes, J. R. Finniecome. Engineer (Lond.), vol. 146, nos. 3790 and 3791, Aug. 31 and Sept 7, 1928. pp. 218–219 and 246–248, 11 figs. Aug. 31: Analysis of tests on pipe bends on basis of Karman theory. Sept. 7: Deflection-stress correction factor; comparison of actual longitudinal stress obtained from tests with Karman longitudinal stress.

STEAM TURBINES

Design. The General Trend of Modern Development in Steam Turbine Practice, H. L. Guy. Metropolitan-Vickers Gaz. (Manchester), vol. 11, no. 185, Aug. 1928, pp. 46–48. Pronounced movement towards higher steam pressures; expedient of installing high-pressure boilers where considerably lower pressure is already established; table giving temperature increases which increase thermal efficiency by steps of 3 per cent; regenerative feed heating; little tendency towards standardization in capacity of plant.

Operation. Shutting Down Steam Turbines with Sinking Boiler Pressure (Auslauf von Dampfturbinen mit sinkendem Kesseldruck), Schlicke. Waerme (Berlin), vol. 51, no. 37, Sept. 15, 1928, pp. 679–680, 1 fig. In peak-load power plant of larger size it is customary when shutting off peak loads to extinguish fire and permit turbo-sets to work with sinking boiler pressure, until output is nearly at no load; in this way heat of radiation of fire which is dying down and large amounts of heat stored in lining and boiler parts can be utilized; author claims there is small gain in use of stored heat and greater advantage in shutting down turbines under full pressure.

STEEL

Cold Rolling. Influence of Cold Rolling and Annealing at Different Temperatures on the Strength and Structure of High-Grade Sheets (Der Einfluss des Kaltwalzens und Gluehens bei verschiedenen Temperaturen auf die Festigkeitseigenschaften und das Gefuege von Qualitaetsfeinblechen), E. Marke. Archiv fuer das Eisenhuettenwesen (Duesseldorf), vol. 2, no. 3, Sept. 1928, pp. 177–183 and (discussion) 183–184, 16 figs. Results of tests to determine mechanical properties and structure of cold-rolled sheet, and cold-rolled sheet subsequently annealed; practical application of results in sheet mills.

Heat Treatment. Effect of Quenching Temperature Change on the Properties of Quenched Steel, O. W. McMullan. Am. Soc. Steel Treating—Trans., vol. 14, no. 4, Oct. 1928, pp. 477–501, 24 figs. Comparison of hardness results obtained by different testers is shown plotted against Vickers hardness as standard; results noted are that maximum surface hardness on high-carbon steels is obtained at low quenching temperatures; maximum center hardness of quenched steel occurs at much higher temperatures along with more or less sudden increase in grain size; marked effect of low temperature draw on hardness and other physical properties of core of S.A.E. 1020 steel.

Fundamentals in the Art of Heat Treatment, D. K. Bullens. Fuels and Furnaces, vol. 6, no. 10, Oct. 1928, pp. 1359–1369, 2 figs. Fundamental factors and their interdependence; relation of initial structure to final structure; importance of temperature-time factors; selection of fuel or electricity for heating; cooling phase; control of factors influencing heat treatment.

Notes on the Relation of Design to Heat Treatment, F. R. Palmer. Am. Soc. Steel Treating—Trans., vol. 14, no. 4, Oct. 1928, pp. 469–476, 11 figs. Paper sets forth fundamental principles of design as they effect heat treatment and subsequently serviceability of finished parts; tool or machine part is properly designed, from standpoint of heat treatment when entire piece may be heated and cooled at approximately same rate, thus eliminating in so far as possible internal strains which develop during quenching due to wide changes of temperature.

Manufacture—Purification. Purifying Steel with Sodium Compounds, J. R. Miller. Blast Furnace and Steel Plant, vol. 16, no. 9, Sept. 1928, pp. 1204–1205, 7 figs. Successful application of these much-studied materials in manufacture of steel results in improved quality; large tonnages of special steel prove its value; both open-hearth and bessemer processes are discussed.

STOKERS

Traveling-Grate. Tests on Furnaces with Special Reference to Furnace Grates (Versuche an Fuerungen, insvesondere an Rost Feuerungen), Koeniger. Archiv fuer Waermewirtschaft (Berlin), vol. 9, no. 9, Sept. 1928, pp. 274–277, 24 figs. Results of tests on traveling grates show that in many cases it would be possible by adapting grate to steam loads, to eliminate necessity of Ruths' steam accumulator.

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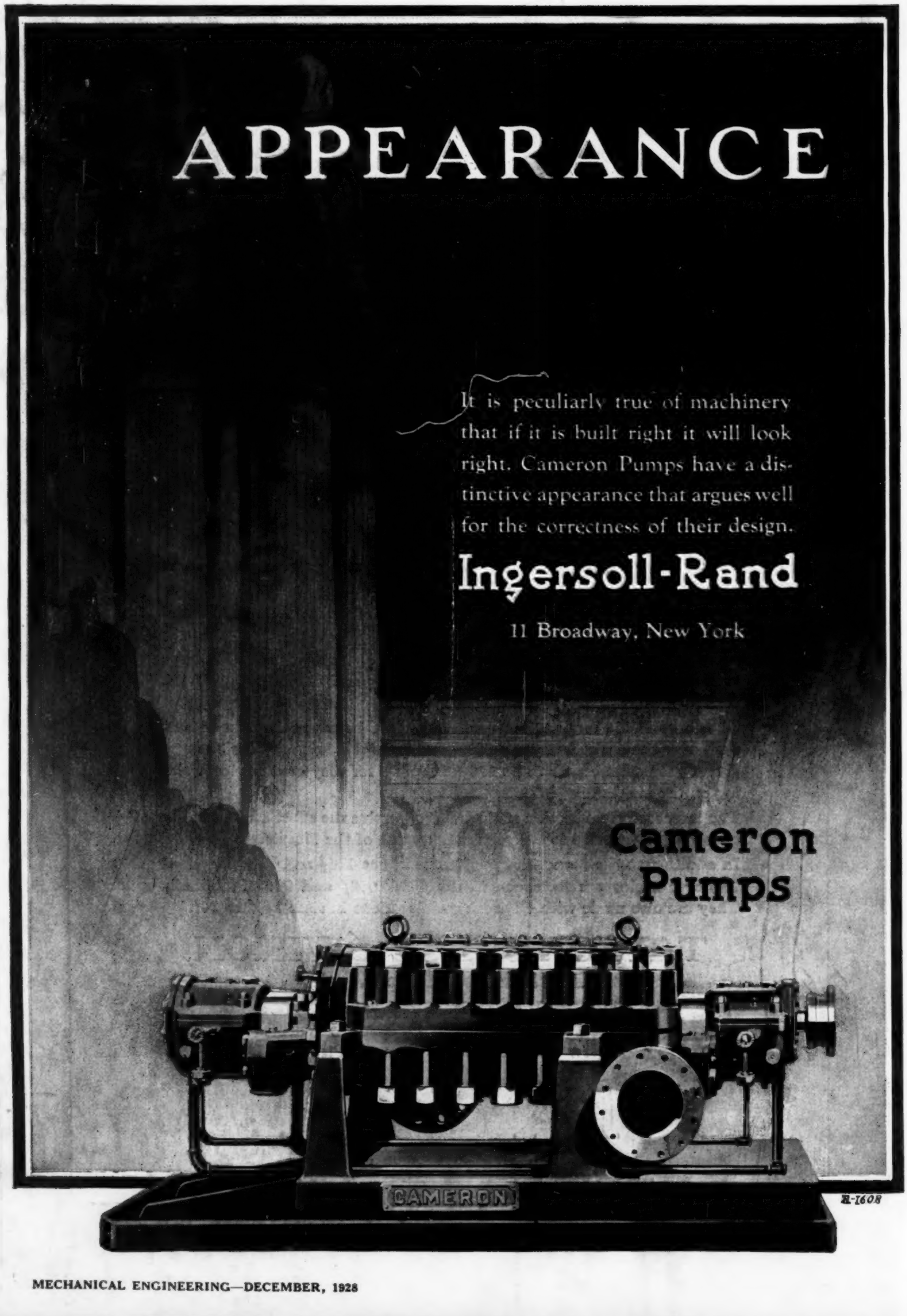
TEMPERATURE CONTROL

Automatic. The Development of Automatic Temperature Control for Industrial Heating Apparatus, A. N. Otis. Fuels and Furnaces, vol. 6, no. 10, Oct. 1928, pp. 1387–1394 and 1398, 7 figs. Author reviews development of temperature-control apparatus and describes various types: bulb-type instruments are used for control of ovens which operate at relatively low temperatures; for temperatures above 1000 deg. fahr., thermocouple instruments may be used.

TUBES

Manufacture. Manufacture of Tubes (La fabrication des tubes), G. deLattre. Technique Moderne (Paris), vol. 20, no. 17, Sept. 1, 1928, pp. 581–585, 3 figs. Treats of different processes of machine work; compares them and shows relative advantages of processes for size and quality of products to be obtained; Mannesmann, Ehrhardt, and Stiefel processes especially described.

Tube Drawing (Technique le l'étirage), G. deLattre. Engineering (Lond.), vol. 126, no. 3268, Aug. 31, 1928, p. 269. Summary of French practice; greater part of this treatise deals with manufacture of tubes, and chiefly those of weldless steel, with special reference to tubes used for construction of bicycles and airplanes; three well-known systems employed for piercing are compared, viz: Mannesmann, Stiefel, and Ehrhardt; author explains his preference for Stiefel system; appendix gives details of tests for strength, hardness, etc. of airplane tubes and boiler tubes.


APPEARANCE
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